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73

Magazine

Wane Green, W2NSD/1
Editor, etcetera

June, 1963

Vol. XIV, No. 6

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drawn by W1MEL

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We told you last month to stop reading the fine print and stick to the articles and editorial.

FLASH FLASH FLASH FLASH

The FCC has just announced that the license fee for new and renewal amateur licenses will be $4.00 effective Jan. 1st, 1964. Modifications will be $2.00, Novices and Races; no charge. Special calls will be $20 (section 12.81). How about that!

de W2NSD

Never say die

A Sense of History

A fellow called up the other day ranting and raging against the ARRL. He had a number of gripes, the foremost of which was that the Building Fund was a hoax. According to this chap the ARRL had been putting money aside for a number of years toward the costs of the new building. He wanted to know why, if they had over $500,000 set aside for a new building, that they are now trying to coax $250,000 out of the members. I couldn't participate in his sense of outrage since it seemed to me that somewhere in the past the members had been warned that the League did have plenty in the bank to build the building, but that they wanted to preserve this fund for some future rainy day.

His second complaint, though I disagreed with it, set me to thinking. His point was that conventions should be serious affairs whose main purpose is to permit the members to gather together to decide how things are going and make any changes they deem valuable. I'll have to admit that this is a far cry from the conventions that I have attended which have featured prizes, manufacturers displays and a series of talks on ham subjects.

This set me to mulling. I must admit here that the years have increased my annoyance at pomp, ritual and other historical remnants. Though history is interesting, I do not believe that we should be a slave of it. Look what happened to those societies which were not able to cast off the yoke of "this is the way my father did it." This is the cry of ignorance. "It has always been this way."

But yesterday is gone and it deserves no reverence since we are living only today. The question is: how are things today? Are they the way we want them? If not, let's make them the way we want them so that when tomorrow becomes today we will have them the best way. This can be particularized by applying the thought to ham radio. Is ham radio today the best that it can be? Judging from the number of letters of frustration that I receive, I would guess not. Then isn't our best bet to take a critical look at ham radio and figure what improvements might make it better fit the present situation? This is something that could be done at conventions.

Are our bands divided up the best way for the current number and type of operators to get the best use from them? Is it possible to provide incentive for general technical development of amateurs, or is this even desirable? Is the ARRL meeting today's needs? Are our experimentally inclined amateurs too contained by the present rules? Would it be advantageous for the possible development of new techniques to simplify the issuance of experimental permits for stations that are interested in trying out new ideas . . . things come to mind such as slow scan TV, narrow band TV, repeater transmitters for VHF and FM, remote operated rigs, etc.

It wouldn't hurt to update our thinking on other matters such as license requirements, enforcement of rules, contests, certificates, and all of the factors which make our hobby the way it is today. Just think of the impact that the DXCC Certificate has on ham radio! It causes fantastic pileups every time a new country comes on the air and it brings on DXpeditions. There are a number of bulletins just devoted to this phase of the hobby and a couple thousand hams totally submerged in it.

Will we always go along leaving things pretty much the way they are, with many fellows opposing anything new automatically? Or can we perhaps some day establish a system of constant re-evaluation of our present situation so that we can better meet the needs of the present when the future arrives?

(Turn to page 6)

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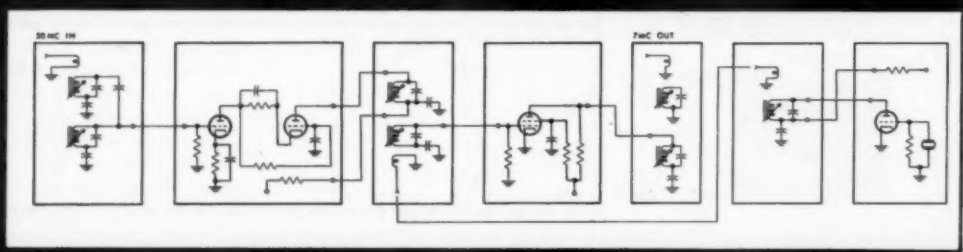

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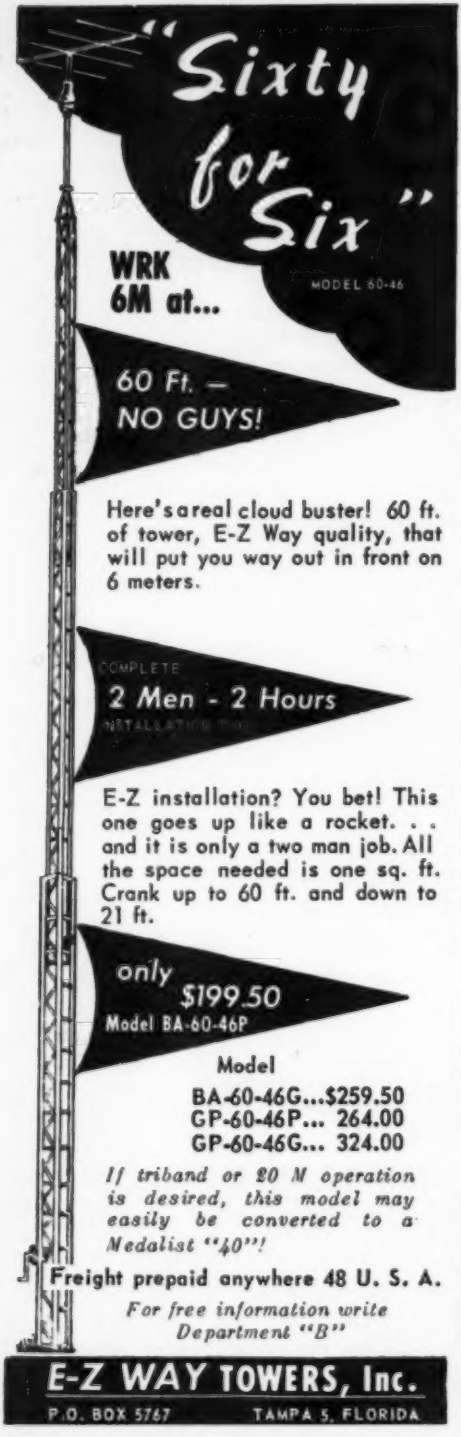
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(W2NSD from page 2)

Out For The Buck

Every now and then I run into someone who says, "Come off it Green, you're out after the buck just like everyone else." It is my belief that seeking money, like seeking happiness, does not find you happiness . . . and usually does not find you money either. People out after the buck usually end up outsmarting themselves; I've seen it happen time after time.

Pardon the oleaginous platitude.

In application this means that 73's subscription rates are the lowest that I can make them and still publish the magazine. I am quite confident that our subscription rates could be increased to the $5.00 of CQ and QST without any great loss of readership for we are giving more magazine and the reader comment, with the exception of an occasional nut, consistently insists that 73 is the most read ham magazine and the most interesting. Perhaps I'd better define nut for you: a nut is anyone who wants to cancel his subscription when he reads an article that he disagrees with . . . or am I being too generous?

We could easily raise our advertising rates considerably without suffering any great loss of advertisers for the cost per reader in 73 is so incredibly far below that that the advertisers have to pay elsewhere that we could almost double our rates and still be a bargain. Though our circulation is now well over seven times our original circulation, our ad rates have not yet doubled. What does this gain? Well, it allows those manufacturers of ham gear who have good products and limited budgets to merchandise their equipment at a minimum expense. Take a good look at our ads and you'll see for yourself. We don't have all of the big manufacturers who really don't care much what their advertising costs, but when it comes to the chaps who have to watch their dollars closely in order to stay in business, they are advertising in 73.

One of the best examples of this is mail-order advertising. The mail-order advertiser knows right away which magazines are giving him results because he can't exist without the results. If you take a few minutes and count the pages of mail-order ads in all three magazines you'll find that month after month 73 has more mail-order than both CQ and QST combined.

If we were to raise our ad rates substantially we might get more "prestige" advertising and we certainly would make more money, but we

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also would push a few more small ham companies out of business. We're making ends meet here . . . anthors are being well paid upon acceptance of their articles . . . our small staff is getting enough to eke out a living up here in budget-living New Hampshire . . . Virginia and I have yet to take any salary, but we're so immersed in running the magazine that it hasn't made any difference.

Running at no profit, as we are, I can see where over $5,000 a month of our money is going into taxes . . . I hate to think what would happen if we made a profit!

SSB on 160M

The FCC has rescinded its prohibition of SSB in the 160 meter band effective April 15th after checking out the possible QRM to the Loran-A in the adjacent band. That should help things somewhat, though it may give a few commercial equipment manufacturers who have left the 160 band out of their rigs some nervous fits.

In Canada

Canadian amateurs may now order our parts kits. The only catch is that they will have to add 45% extra to cover little government foibles such as the currency difference, import duty and sales tax (8% plus 20% plus 11%, cumulative!).

It occurred to me the other day that I have dedicated my life to ham radio. That shows you how a hobby can get out of hand, eh? The beginning of my publishing career was back in 1951 when I put out the first mimeographed RTTY bulletin. This grew and grew until, through a strange sequence, I found myself editor of CQ in Jan. '55. I hung on there at least two years longer than I should have and finally left in disgust in January 1960. In April I started the groundwork for 73 and the first issue came out in October 1960. And here I am.

I guess mostly I am working at this to provide a magazine that will be fun to read and perhaps make ham radio a little more enjoyable than if I didn't exist. I feel a personal grudge against the few fatherless fellows who have crept into our hobby and want to use it to spread their unpleasant personalities beyond the circle of their families and work.

As Virginia puts it, "Not very many writers get a chance to entertain 75,000 people every month, pretty much on their own terms." That is good, isn't it?

Incentive Licensing

Since the whole subject was brought up in QST entirely for the purpose of creating con-

(Turn to page 118)

Herbert Holtje W2TQS
151 Sunset Lane
Tenafly, New Jersey

Photo by WA2MXT

Instant 220

Using the AN/DMQ-2

Suggesting the use of frequencies above 144 mc to most amateurs today is like campaigning for CB on 10. Most of the resistance (or impedance if you consider the reluctance) comes from the feeling that you have to hold an EE to even tune a 220 rig. It's true that you've got to be a little more careful with lead length and component layout, but if you've ever built anything at all (kits even), a little care is all that is necessary to do an acceptable job on 220.

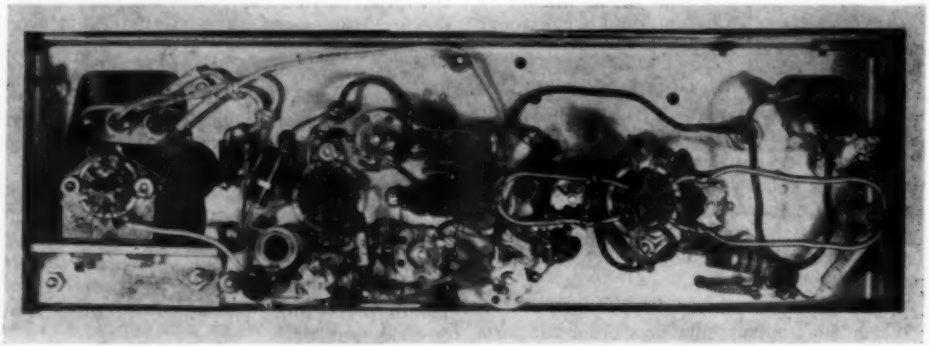
And if you're really interested in these fascinating frequencies, there's a piece of surplus gear available for around fifteen bucks (with tubes) that can be modified in a few hours to put out a very respectable signal for all of its 12 watts input. Barry lists it simply as "VHF Transmitter," and other surplus houses call it the AN/DMQ-2. This rig has been described before in a conversion to two meters, but the conversion to 220 is much simpler.

Originally intended for use at 240 mc, it is only a matter of changing the 60 mc third overtone crystal to a 55 mc rock, eliminating a few parts and squeezing a few coils to get output on 220. There are some refinements (which will be discussed in this article), but it's as simple as that.

Let's go thru the modifications, section at a time. First of all, when you get your rig, it will have a spring loaded antenna which is held in place with heavy twine. When you cut the cord, point the antenna away from you, or you're liable to be the first ham on your block skewered on a whip.

Four bolts hold the gasketed rig in its watertight container. Remove these and slide the rig out. The first step is to get the antenna out of its well and replace it with a standard coax fitting. This is done by cutting the antenna lead, backing off on the knurled retaining nut and sliding the whole assembly out of the rack. When this has been done, run a short #12 tinned lead from the antenna link to the newly installed fitting.

The next step is optional, but I found it



Up-ended view of the converted 220 mc transmitter. Note the amount of compression in the final tank and output loop to put it on 220. The positioning of the added choke in the final grid circuit can be seen to the left of the grid coil. The bracket supporting the VR tube socket is positioned in the space previously occupied by the keying motor. The grid circuit metering jacks are re-mounted above the chassis and can be seen thru the opening next to the VR socket.

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- **BFO with variable carrier injection for SSB reception.**
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- **EXCELLENT audio characteristics. 2 watts into 3.2 ohm speaker.**
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The THOR 6 is of two unit construction with attractively styled receiver and transmitter rf section mounted in one cabinet for convenient desk top operation. The power supply/modulator section is mounted in a second cabinet for remote location. A ten foot interconnecting cable is provided.

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much easier to work with a standard Jones plug and socket for the power connections than the bulky military plug that is supplied with each rig. This plug comes off by backing off the nut on the connector shank on the inside cover. To get a Jones plug in, it is necessary to file the round hole square.

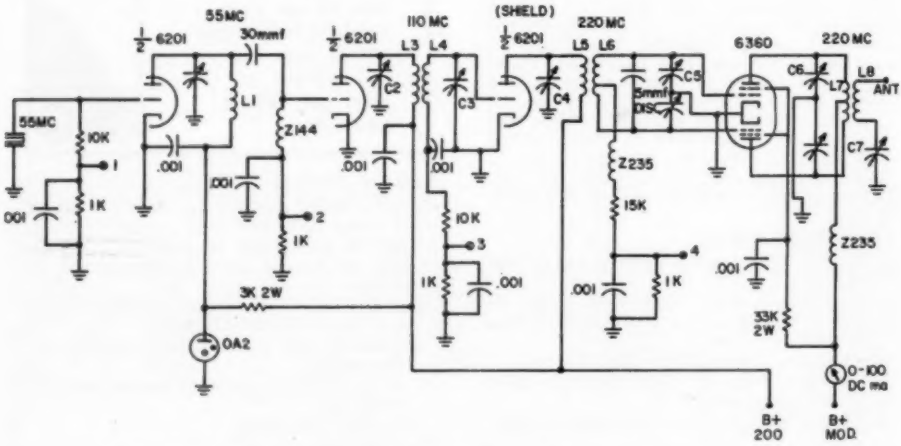
Next, remove the motor keyer on the rear of the chassis. The leads from this are traced to their original and removed. They are: 1) power, 2) keyer control (to the cathode of the tone modulator). While you're fussing with the keyer, remove all wiring to the second half of the second 6201 and ground the unused grid, plate, and cathode. In removing this wiring, you will remove a transformer, 2 resistors to pin 8, a resistor and capacitor to pin 7 and a resistor and capacitor to pin 6. Discard these components (unless you're like me and collect things because someday you might find a use for them—spark gaps, etc.). These components make up the tone modulating circuit. Lift the lead from the screens of the 6360 and make the final amplifier modifications as shown on the diagram. The final plate and screen are now wired for modulation and can be operated with any modulator delivering from 6 to 10 watts, depending on power input. Don't run the 6360 any higher than 20 watts input.

The oscillator is very simple to change. All that's necessary is to eliminate the coil in the cathode circuit and ground the cathode. The feedback capacitor on the plate coil center tap is removed and the oscillator is ready to go with a 55 mc rock. The voltage regulator brings the plate voltage to a safe point for the overtone crystal and reduces the instability found in overtone oscillator circuits.

The only changes required in the two doubler stages are to squeeze the coils and adjust the capacitors to resonate at 220. Use a grid dipper here.

The grid circuit of the final was the stickiest problem, in that the drive was marginal. This was solved simply by adding one of the Z235 chokes, taken from the final wiring, to the 15K grid resistor and adding a 5 mmfd disc capacitor across the 6360 grid tuning capacitor. Shielding the driver then brings the drive to the point where there's enough to spare. My rig runs a mil and a quarter, but it has run well with only one mil.

That's it in a very small nutshell. Tuning is simple and straightforward. Pin jacks are already provided in each grid circuit. Tune each for maximum. Tuning the final is done most accurately by using both the plate meter and a field strength meter. The point of maximum output does not occur at the lowest point in plate current dip, so it is better to rely on the field strength meter for the point maximum output. Actual loading of an antenna is, of



L_1, L_2, L_3, L_4 can be resonated by adjusting capacitor (Use GDO)
L_5, L_6 should be brought close together and resonated with capacitor (Use GDO)
L_7, L_8 should be squeezed and resonated with capacitor (Use GDO)
By adding Z235 choke in grid return, placing 5mmf across final grid coil, and shielding the multiplier/driver tube, enough drive is available for 6360
Check all grids for maximum
Adjust final for dip on plate meter, and max output on field strength meter
Ground unused elements in 2nd multiplier

course, accomplished by dipping and loading with the link capacitor.

How does it work? Using a 12 element colinear array from an average VHF location, I work 20 to 30 miles each evening with the regular crowd on 220 in northern New Jersey, and when conditions are right, distances of 80 to 100 miles have been covered with S7 to S9 reports. I haven't had the chance to put this rig to the rest during a really bang-up opening, but judging from these results, I'm sure that it will be in there with the best of them.

There are other ways to modify this rig for 220, and one of the more popular approaches around here has been to completely modify the oscillator and multipliers so that 8 mc crystals can be used. I have not done this, but it does have several important advantages. The most important of these are: 1) 8 mc rock are less expensive than 55 mc overtone crystals, 2) a higher degree of stability is obtainable than with overtone oscillators (for you purists).

That's it. Now that you've got your 220 rigs going, I'm looking for some over-the-horizon skeds to W1, W3 and W4. A note of thanks is in order here to K2HGH, K2DIG and W2BPU for their help and on-the-air reports during the "I-think-I-should-go-back-to-stamp-collecting period."

. . . W2TQS

More Selectivity for the RT-91/ARC-2 Transceiver

Gilbert de la Laing W6BJI

An article appearing recently in 73 Magazine [1] described the RT-91/ARC-2 transceiver together with a method of conversion to ac power. This transceiver makes a very convenient means for covering the many MARS frequencies plus coverage of the 80 and 40 meter bands. The ability to have transmitter and receiver tuned to 8 spot frequencies and loaded correctly to the antenna through the Autotune feature is worth the price of the equipment many times over.

There is one area in the receiver, however, that needs improving. The selectivity leaves much to be desired in the crowded ham bands and affords little protection from signals adjacent to the MARS channels.

This article is intended to offer one means of obtaining a vast improvement in selectivity with a very small outlay for parts. Less than 2 dollars should provide the necessary parts.

Obtaining the desired improvement in selectivity through conversion of the *if* signal to a lower frequency as in the "Q-Fiver" selectivity scheme is impractical. The "Q-Multiplier" approach is equally impractical due to the fact that the *if* frequency is not fixed but varies from 1 to 1.5 mc, being gang-tuned along with the PTO, multipliers, rf and mixer stages.

Adding controllable regeneration to the first and second *if* stages and reducing the coupling between the *if* stages provides a means of obtaining a worthwhile improvement in selectivity. To effect these changes, change C-201, C-210, and C-219 from 5 mmfd each to 3 mmfd each. These capacitors can be found under the *if* shield cans located near V-109, the 12SA7 mixer tube. Now add a "gimmick," two short lengths of insulated wire 1 inch long twisted together to form a small capacitor, between plate (pin 8) and grid (pin 4) of the V-110 socket. Increase or decrease the capacity of the gimmick until the *if* stage nears the threshold of oscillation. Add a similar gimmick between plate and grid connections on the V-111 socket and adjust similarly. Remove the "L.F. REC./NORMAL" switch on the front panel and install a 2,500 ohm potentiometer. Connect the potentiometer in place of R-139, the cathode bias resistor for V-110. This control will then serve to control regeneration in the *if* strip.

The movable *if* slug should then be peaked. These are marked D1, D2, D3, D4, E1, F1. Peaking the *if* transformers may cause oscillation in the *if* strip and require a reduction in the capacity of the gimmicks.

These changes should result in 10 kc or better selectivity. . . . W6BJI

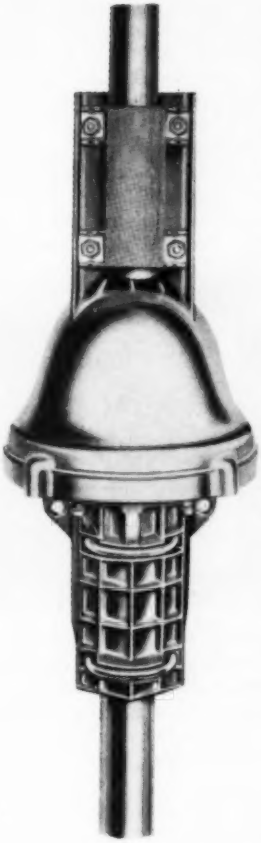
1 Pafenberg, R. The AN/ARC-2, 73, Vol. XI, No. 1, October 1962, 82.

PARTS LIST

C-201, C-210, C-219—3 mmfd tubular ceramic capacitors.
R-139—2,500 ohm potentiometer.

$59.95

amateur net



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PE-97A? What's that?

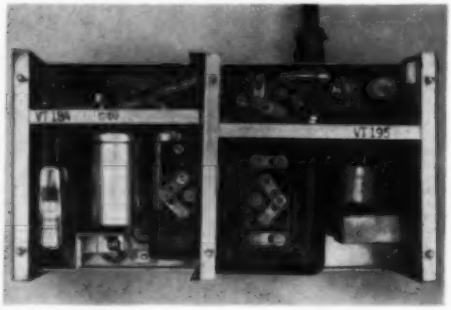
or . . . 12 in, 250 out

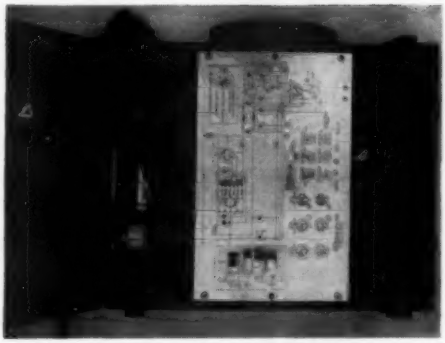
Blackie Blackburn W4DWU
2620 N. Brandywine St.
Arlington 7, Va.

Power supplies may not be too exotic a subject, but every mobile needs one or more. The unit described here gives 250 volts dc at 100 ma or better with 12 volt/3.5 amp dc input, just right for a Heath TWOER or similar rig. Conversion of the PE-97-A (or the similar PE-120-A) yields a highly rugged but compact mobile supply whose husky military components are not often found in amateur gear.

This is one of the easiest surplus conversions you can make, despite the fact that the PE-97-A as received from your friendly surplus dealer appears to be a totally unlikely prospect of ever amounting to anything. In the first place the output voltages are all wrong for most uses, being 125 volts dc and 75 volts dc under transmitting load, along with 1.4 vdc for filaments. In the second place, it is a little large to tuck away nicely in various corners of a car. Boosting the output to a more useful 250 volts dc is covered below, while the size problem is taken care of by extracting the basic power pack from its somewhat out-sized case.

A very simple electrical conversion to provide 250 volts dc output instead of 125 volts is possible because the power supply contains three terminal boards with links which were originally provided to permit setting up for either 6 or 12 volt battery input. What we are going to do is operate only on 12 volts dc input, but set the links on the transformer





primary terminal board for *6 volt* operation—thus giving us just twice the original secondary voltage and a resultant 250 volts dc output at 100 ma. Sneaky, huh? This is quite permissible since components are conservatively rated, including the filter capacitors which are 400 wvdc.

Per the schematic of Fig. 1, terminal board "A" is set for 6 volts input. At terminal board "B" the .4 ohm resistor is strapped out (link between 13 and 14); also at "B", the 20 ohm resistor R3 is left in the circuit to drop 12 volts to 6 for the vibrator coil (no link between 13 and 15). Ignore terminal board "C".

Since the 6.3 volt rectifier tube filaments are run from another winding on the same power transformer, this became 12 volts when we doubled the plate voltage. There are several ways out of this little box, the simplest being to place a filament dropping resistor in series with the lead from the filament winding on the transformer to pin 8 of rectifier tube VT-195 (RMA type CK-1005). A 56 or 62 ohm 2 watt resistor would serve. However, the CK-1005 is the one component not conservatively rated and replacements are not easy to find. Another approach is to replace the 6 volt CK-1005 with a 12 volt tube such as a 12X4, but this would entail more extensive rewiring and a socket

change (i.e., work) and is to be avoided at all costs.

The solution used here was to take the base from an octal tube and mount surplus silicon diodes in same. This can be plugged directly into the CK-1005 socket, burns up no power in dropping resistors or filaments and provides a good margin of safety for handling the higher plate voltage and for pulling a little extra plate current if need be. Four diodes are used in series in each leg; unfortunately, these diodes are so surplus that they cannot be identified—but they have sufficient margin in rating so that protective resistors or capacitors across each diode are not required. Barry Electronics has 600 piv/750 ma diodes for 36 cents each. Two such diodes should suffice for each leg if protected with a 500K resistor (or .01 mfd capacitor) across each diode, as shown in Fig. 2. Here again, a good scrounge artist will find ways to make do.

Electrically, that's about all there is to it. In order to hold things down under no-load conditions, the regulator tube VT-184 (VR-90) was replaced with a VR-150 and resistor R7 increased to 5,000 ohms. A 10,000 ohm resistor could have been used just as well in place of this combination—the objective being to put about a 30 ma load on the supply before filaments are warm in the rig. Regarding terminal board "C", do not try to pick off your 12 volts for transmitter or receiver filaments from socket 3 with the idea of getting filtered filament voltage through the CH3 network. The original designers were very crafty here and used the 7 ohm dc resistance of filament choke CH3 to take 6 volts down to 1.4. This sort of thing we can do without; either take filament voltage directly from the battery, or set ter-

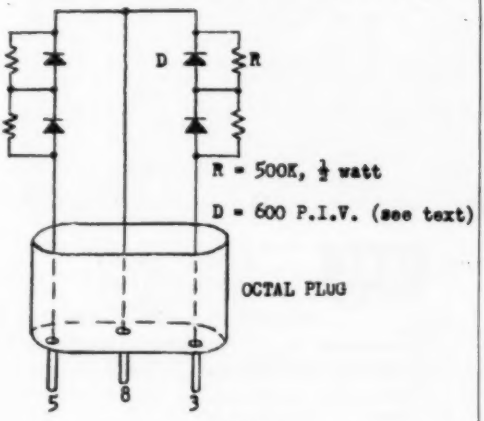


Fig. 2

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2 Meter 7 element	A144-7	8.85
2 Meter 11 element	A144-11	12.75
6 Meter 3 element	A50-3	13.95
6 Meter 5 element	A50-5	19.50
6 Meter 6 element	A50-6	32.50
6 Meter 10 element	A50-10	49.50
DUAL STACKS (B)		
3/4 Meter 22 element	A430-11 D	18.50
1 1/4 Meter 22 element	A220-11 D	22.90
2 Meter 14 element	A144-7 D	21.25
2 Meter 22 element	A144-11 D	29.00
QUADS (C)		
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2 Meter 28 element	A144-7 Q	62.50
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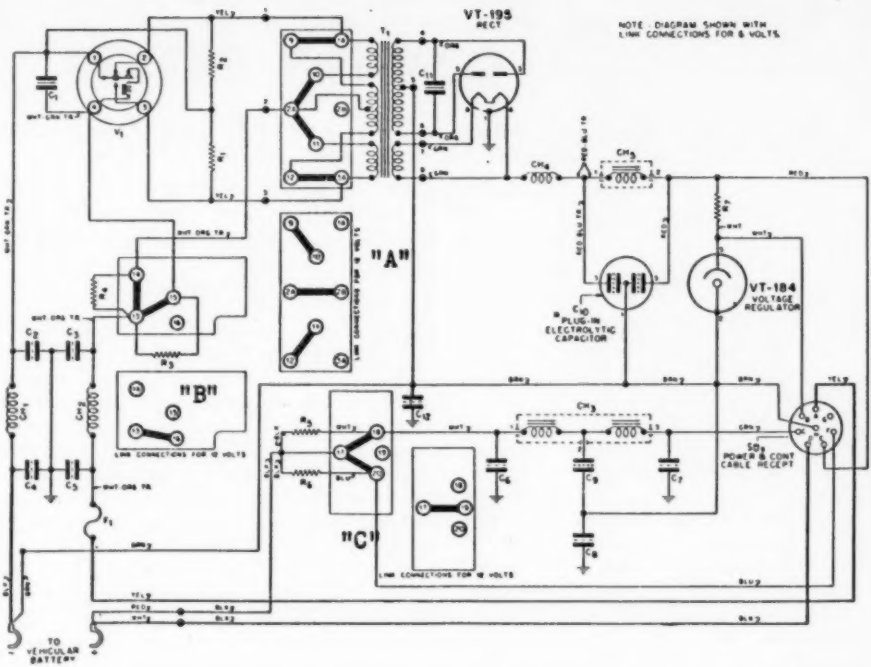


minal board "C" to the 6 volt or straight-through position and short CH3 out. By keeping your filament leads completely out of the vibrator box no filtering is required in most applications, the TWOER being one such.

The only mechanical problem of any proportion is in saving the 10-foot battery cables when removing the basic power unit from its outer container. The rubber seals through which the cables run *can* be removed with a little surgery, and you will wind up with some nice heavy cables still hooked directly to the power unit. Various ways can be devised to lash the supply up to available equipment. By jumpering the input plus 12 volt cable directly to fuse F1 in the case, a remote on-off switch can be placed in either the plus or minus 12 volt battery cable. A spare wire in the cable was used to take plus 250 out.

In casting around for a PE-97-A you may encounter a very similar unit, the PE-120-A. The former is to be preferred since components are more accessible. The PE-120-A uses a rather weird system of special plug-in vibrators for each input voltage (6, 12 or 24) which make the correct transformer primary connections, instead of by terminal board connections as in the PE-97-A. Either use a 6 volt vibrator and add a 20 ohm resistor in series with the vibrator coil (pin 4) as done with the PE-120-A, or use a 12 volt vibrator and shift primary connections at the transformer terminals. Circuit tracing is facilitated by the large schematic printed on the metal cover of the unit. One word of caution: the PE-120-A appears to use 200 wvdc filter capacitors; if this is the case, either replace them or use the unit for a boat anchor.

Vibrators of 1944 vintage may have become inoperative during storage due to oxidation of the contacts. Before concluding that a replacement is required, try giving the vibrator a few good healthy whacks when first energized. If this doesn't work, a seemingly dead vibrator can sometimes be brought back to life by applying ac voltage from a filament transformer to the vibrator coil pins instead of dc.

The PE-97-A is available from various surplus sources and MARS programs; it powers the BC-620-A, part of the SCR-510-A. Unless the price is right, say zero to eight dollars, forget the whole thing—you can buy a new supply to do the same job for $25 or so, although not of such rugged "Mil Spec" construction. A peek at the innards of the PE-97-A will quickly convince you that here is real quality, well-worth putting to use. . . . W4DWU

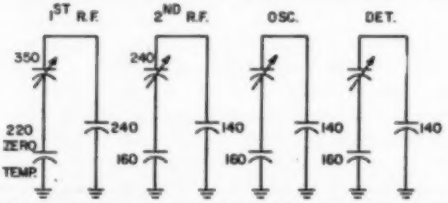
Band Spreading the BC-348

Albert Hankinson W5EUL
5409 South Drexel
Oklahoma City 19, Oklahoma

Back in 1947, I squandered about thirty dollars on a BC-348. After a year or so of ownership, I was thoroughly convinced that I needed something of a slightly higher caliber, to say the least. This was postponed due to the type of work at the time which involved travel and which continued until 1955. The end of the travel in 1955 was complicated by marriage so I still had the 348 with added expenses and lowered funds involved.

During this time, I periodically pulled the 348 up on the bench and added and subtracted wires, tubes, parts, knobs, and FL-8 filters. I tried improving the crystal filter, added an outboard Q5er, in addition to another audio stage, all with a measure of success, however slight. For one reason or another, each time I have restored the receiver to "nearly" its original condition. "Nearly" meaning, the rf and af gain controls are still split, and the front end has been converted to 717's instead of the original 6SK7's, and the addition of a noise limiter.

Through all this time, the same basic problem has existed, rotten selectivity! The outboard Q5er alleviated this problem but in itself contributed others, mainly being outboard and having a poor audio system. This in itself is fairly easy to remedy by using any one of many ways of converting the 915 kc *if* to a lower frequency, preferably 85 kc. However, what seemed to be a stumbling block, was the pitifully small space on the dial alloted to the amateur bands. This was particularly annoying when one considered the vast amount of dial not being employed for any gainful use.



Note: Fixed capacitors should be zero-temp types if possible.

This called for circuit analysis and possible surgery! Upon examining the schematic, in conjunction with a bird's-eye view of the receiver, it was noted that with no great difficulty, one could get at the leads on top of the main variable. The view shows immediately that the section associated with the 1st rf stage is larger than the other three sections. According to the Tech manual, the large section is 350 mmfd, while the other three are 240 mmfd. Under the urging of W5NTL, I decided to try basic surgery which seemed logical, and spread the amateur bands over a much larger area.

The main thing about this modification is that it worked and that it was accomplished at a cost of approximately $2.00. There are advantages and disadvantages to this modification which are left to the individual. I think the advantages outweigh the disadvantages, in addition, a little additional work on the receiver would possibly eliminate most of the disadvantages.

Fig. 1 just about tells the entire story of the basic modification.

With reference to Fig. 1, note that the lead to the coil box from the tuning capacitor has been opened and a 220 mmfd capacitor inserted. (This is with reference to the 1st rf stage.) This series capacity reduces the total capacity for this leg to less than 220 mmfd. The same thing is done in the 2nd rf, oscillator and detector stages. In the latter stages, the value of the series capacitor is 140 mmfd. What has been accomplished here is to keep the new total capacity in the proper proportion. This is important in order to maintain our basic tracking. Reducing the total capacity by itself would merely cause our bands to drop to lower dial readings on the receiver so a further step is required. By adding a capacitor in parallel with the series combination, we

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restore the total capacity to its original value. (Or close thereto.) Now, when we start spinning our tuning control, the rate of change per turn of the control has been greatly reduced.

On completion of this part of the modification, things started to look much brighter. On the 3.5 to 6 mc band, the low end of the dial was found to be 3550 kc while the top of the band (4000kc) was 5.575 on the dial. This means that approximately 450 kc of the band is now spread over 2000 kcs on the original dial. This is better than four times the original and is certainly not hard to take.

On twenty, 14 mc was found at 15.5 on the dial while 14350 was at 17. Again, the improvement was more than 4 times the original. On forty, and here panic set it! Frantic spinning of the dial revealed *no* forty meter band. Everything seemed black! Finally I combed the 6 to 9.5 band and found that 9.5 mc (dial) corresponded to a frequency of approximately 6875 kc. On examining the schematic, it was found that small padders were in the circuit associated with Band 4 (6 to 9.5). These capacitors are listed as Part #31 (160 mmfd), #38 (85 mmfd), #39-1 (81 mmfd) and #35-1 (95 mmfd). By opening the tops of the coil sections, these capacitors can be identified by locating the trimmer for Band 4 and lifting the capacitor which is tied to one end of the trimmer.

This is not difficult to locate as these trimmers are dual ceramic trimmers and one end of each is tied to a common lead. On lifting these four capacitors, I found my precious forty meters now appeared between 6.4 and 7.35 on the dial, or the 300 kc of forty were now spread out over 950 kc on the dial.

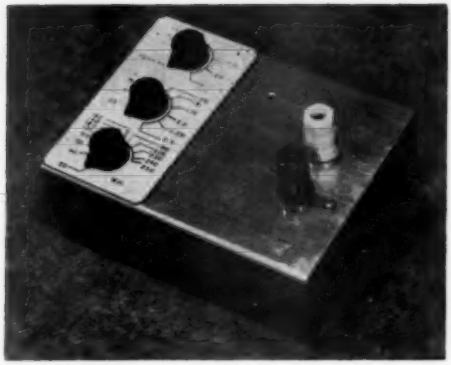
Unfortunately, 160 meters has almost completely vanished. A little more work may restore this by using the same procedure applied to Band 4.

It is necessary to obtain the services of a frequency standard in spotting the bands. As a final step, you could remove the front plate and make up a new dial plate. If one takes the trouble to dig back through the past years of technical magazines, there are many other worthwhile modifications that can transform this venerable veteran into something other than a good boat anchor.

One small note, I could not obtain 140 mmfd capacitors at my local source of supply so I temporarily substituted 130 mmfd which work just fine. I estimate that to return the 348 to its original condition would require about 15 minutes maximum. Have fun!!

. . . W5EUL

The Lazy Man's Coil Evaluator



Parts Kit Available

David Yeoman W0QWY
RR #1
Toddville, Iowa

When WØLFH asked if I know a simple way to check audio coil inductance, I had to give him a no. I no sooner got home than I found the November issue of 73 with an article entitled "Choke Evaluator."[1] At first I thought this was the answer to Si's problem, but after reading the article, I wasn't so sure. The mention of: 1, having brains, 2, square roots, and 3, ten minutes calculation time didn't appeal to me.

Now I'm not much of an originator. I seldom have an original idea, but give me an inspiration and I'm bound to come up with a modification. Thus armed with the inspiration and a lazy streak, I set off to design the "Lazy Man's Coil Evaluator."

Theory of Operation

For those interested in such things, a few mathematical gymnastics will serve to justify this approach to coil checking. Consider Fig. 1, a simple series circuit. In such a circuit, the current is the same in all parts, and is determined by Ohms law for ac circuits, I=E/Z. E is the source voltage, and Z is the impedance of the circuit. Someone else decided that $Z=\sqrt{R^2+X^2}$. R is the resistance in the circuit and X is the reactance, ($2\pi fL$ for coils).

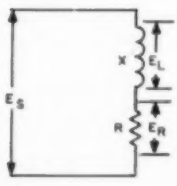


Fig. 1

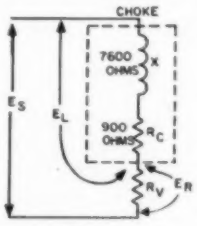


Fig. 2

If we were to calculate the voltage across the coil, we would use the above current and the first formula juggled around for voltage, EIZ. For a perfect coil, this reduces to E=IX, since there is no resistance included. The voltage across the resistor is E=IR.

From above, since the current is the same in both the coil and resistor, if we make the resistor equal to the reactance of the coil, we see that both voltages will be equal.

This is the basis for the tester. We put a variable resistor in series with the coil, connect the combination to a voltage source, and adjust the resistance value until the voltage across each element is the same. The resistance is then equal to the reactance of the coil. This resistance is used to calculate the coil inductance from L=R/6.28f.[2] Easier yet, we can calibrate the variable resistor to read directly in inductance (if we use a single test frequency).

"But wait," you say, "we can't buy a perfect coil. They all have resistance in them." I agree, so let's determine how much error this causes.

Consider the filter choke mentioned in the "Choke Evaluator" article. It was a 20 henry choke with 900 ohms coil resistance. For this coil the reactance is about 7600 ohms at 60

[1] Ives, Ronald. **Choke Evaluator**, 73, November 1962, p 72.

[2] Since $X_L=2\pi fL$, $L=X/2\pi f$. We have set $R_V=X_L$, thus $L=R_V/2\pi f$, $2\pi=6.28$.

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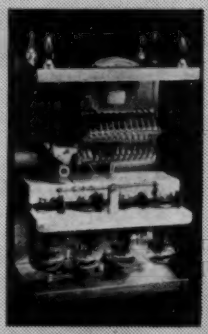

3 BANDS
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Consider These Conservative Ratings:

- DC INPUT — Single Tone — 500 Watts
- BANDWIDTH — 3 db attenuation in excess of 300 KC on all bands
- TUBE COMPLIMENT — Four GE 7984 Compactron Pentodes each with a 35 watt plate dissipation
- INPUT — Untuned — 50 Ohms — Passive grid with built-in swamping
- OUTPUT — Adjustable Pi to a 50 Ohm unbalanced line
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  DC — LSA-3/12 — for 12 V. DC Input
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  270 V at 100 MA Screen
  0-90 V Negative Bias
  12.6 V — Filament

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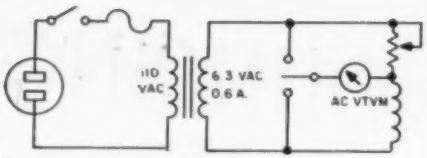


FIG 3

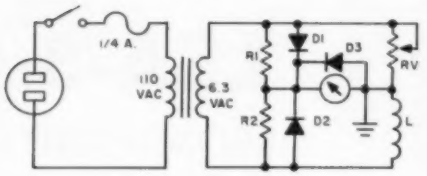


FIG 4

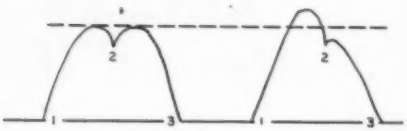


FIG 5

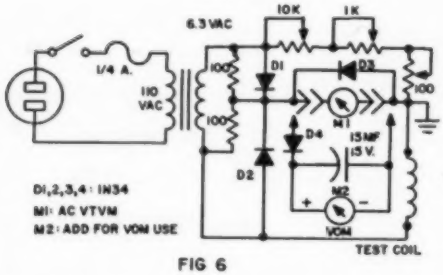


FIG 6

cycles. Now we have the circuit in Fig. 2. Since we can't separate the resistance from the reactance in the coil, we will have to be content to measure the voltage across the combination, or impedance instead of the reactance alone as was originally described. Since $Z=\sqrt{R^2+X^2}$, the impedance of this coil is $\sqrt{900^2+7600^2}$ or about 7650 ohms. Compared to the reactance of 7600, this is an error of only 0.65%, not even noticeable. For a coil with a Q of only 5, (the coil above has 8.4) the error is only 2%. Considering the accuracy to which we can measure our variable resistance, we can forget any resistance in the coil for practical purposes.

The circuit in Fig. 3 was my first idea. The push button is used to switch the meter across either the coil or resistor.

Then the old lazy streak set in again. Gosh it's a strain to push that button. Arrive Fig. 4.

When they see the circuit, most people say, "Aha, a bridge." "Not so," sez I. "It's an electronic push button." Picture it this way. At some time, the voltage at the top of the transformer is positive with respect to the bottom. To diode D1, this looks like forward bias through R2. Current thus flows through this path, and most of the resulting voltage appears across R2. We can then consider the junction, and hence the hot meter lead effectively connected to the top of the resistor, R_V. Slightly later, during the second half of the line cycle, the condition is reversed and the meter is connected across the coil.

The voltage the meter "sees" is depicted in Fig. 5. When both resistance and reactance are 1, equal, the voltage waveform is shown in 5A. The resistor voltage is from 1 to 2. At 2, the transformer voltage reverses and the meter is connected across the coil. It now sees the voltage, Fig. 5A, 2 to 3. If the resistance were greater than the coil reactance, the voltage waveform would be as in Fig. 5B. If the reactance were greater than the resistance, voltage 2 to 3 would be the greater. In either case, the peak voltage is greater than when the two voltages are equal. This results in a pronounced meter dip when the two are equal.

Now all we have to do is turn the pot until the meter dips to a minimum, and we have it all set. Diode D3 clamps the negative voltage excursions to zero, makes the dip deeper and also does away with effects of the change of current phase when changing the pot.

The final circuit is shown in Fig. 6. It is the same as Fig. 4 except that 3 pots are used instead of 1. This allows more accurate calibration and ease of reading. No particular care need be exercised during construction. The original was a ball of wire on the bench and it worked fine.

Although 1N34 diodes are shown, just about any diodes will work providing D1 and D2 are the same type.

If a VOM is to be used in place of a VTVM, the circuit in Fig. 6 should be added. The meter should then be used on a dc voltage scale. The dip isn't quite as sharp as when using a VTVM but the results are satisfactory.

Calibration Procedure

Calibration is simple. The only test equipment required is an ohmmeter. With the tester disconnected from the powerline, and no coil connected, connect the ohmmeter from ground to the transformer lead going to the pots. Turn all the pots to minimum resistance. The resistance you now read determines the minimum inductance that can be measured. Use the formula L=R/377 to determine this induct-

ance, and mark it opposite the pointer of the 100 ohm pot.[3] R is the resistance read on the ohmmeter.

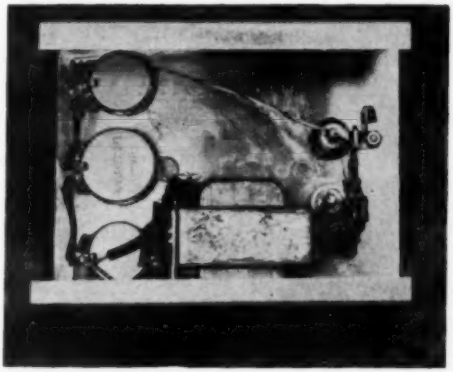
Turning the 100 ohm pot, make calibration marks for the points listed in the chart, and return it to minimum resistance. Repeat with the 1K pot for its points. Finally with the 100 and 1K pots at minimum, mark the 10K pot at its points. After these points are marked, transfer the appropriate inductance values from the chart to the marks on the test set. This finishes the calibration.

To use the tester, first turn all the pots to the *maximum* position. Connect the coil to the terminals, the VTVM to the meter terminals, and turn on the power. Starting with the 10K pot, turn it down until a dip is found on the meter. When it is, turn the 10K back to the next higher mark. Do likewise with the 1K and 100 ohm pots, leaving the 100 ohm in place when the dip is reached. The inductance of the coil is the sum of the values read on the dials. For example, a 16.2 henry choke would read 15 on the 10K pot, 1 on the 1K and 0.2 on the 100 ohm. If a coil is smaller than the values covered by a pot, no dip will be found with that pot, and it should be turned to the minimum resistance position, and proceed as usual with the remaining pots.

Although not designed with this in mind, the evaluator may be used to measure capacitor values. As shown the range is limited to those only larger than 0.25 mfd, but a 1 meg pot in series with the 3 shown will extend the range to 0.003 (at 60 cycles). A Shure Reactance Rule is a convenient method of evaluating the capacitance. The same theory applies in this application.

This little tester is not a precision instrument but it is capable of being a big help when trying to identify that strange mass of wire you just dragged from the junk box. With care in the calibration procedure your answers should be within about 5% of the actual value. For reactances below the range of the tester, the same principle can be applied using a higher test frequency. . . . WØQWY

[3] $2\pi f=377$ when $f=60$.



60 CYCLE CALIBRATION POINTS

	Resistance (ohms)	Inductance
100 ohm pot	7.6	20.0 mh
	15.2	40.0
	23	60.0
	30.5	80.0
	38	100
	45.5	120
	53	140
	61	160
	68.5	180
	76	200
	83.5	220
	91	240
	95	250
	99	260
1K pot	95	.250 Henries
	190	.50
	285	.75
	380	1.00
	475	1.25
	570	1.50
	665	1.75
	760	2.00
	855	2.25
	950	2.50
10K pot	950	2.5
	1900	5.0
	2850	7.5
	3800	10.0
	4750	12.5
	5700	15.0
	6650	17.5
	7600	20.0
	8550	22.5
	9500	25.0

Parts Kit Available

See page 123 for full info on 73 parts kits. This unit catalogs at $9.60 and is available through the 73 Kit Program for $9.00. Request Kit WØQWY.

Letters

Dear Wayne:

Just a confirmation that Joe Williams, W6SFM, was right when he thought his GG preamp (P40 73 Mar. 63) would work all right on two meters. I made one up as a plug-in to go ahead of the receiver in my Comm. II, using the Fig. 2B input circuit and shunt output to avoid modifying the receiver, and robbing the power from the receiver plug. The Gonset had been changed to use a 6BZ8 RF amp, so gain was available, but now when I plug in the antenna, the noise comes up, which indicates, I believe, a limiting point on noise figure. Also, K1USU, cross-polarized and on the far side of the ridge, who was unreadable previously, except for occasional words, is now weak but solid even on the ground-plane.

. . . Joel S. Look W1KCR

Converting the BC-230

Carl Drumeller W5EHC
5824 North West 58th Street
Oklahoma City 22, Oklahoma

One piece of war surplus gear that has been sadly neglected by the amateur is the BC-230 or BC-430, the latter differing only in being for 24-volt supply instead of 12-volt. These little transmitters still may be obtained from surplus houses for from $3.50 up. They are complete with modulator, and, with available plug-in coil units, they cover a range from 2.5 to 7.5 mc. This range readily may be extended to cover from 1.8 to 29.7 mc.

The author has converted a number of these units and has supplied conversion information to many other amateurs. It is his belief that the BC-230 offers much greater ease in conversion as well as much greater versatility than some of the more popular surplus gear. The purpose of this article is to give a brief description of three of the many possible conversions. Each has been thoroughly tested in extended use and found to be quite satisfactory for either mobile or fixed operation.

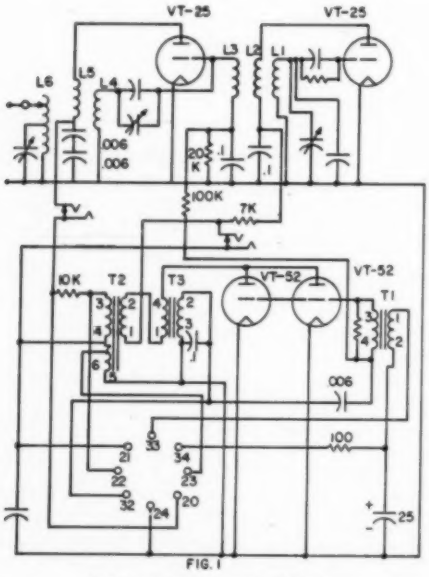


FIG. 1
Original circuit of BC-230

As it is sold, the BC-230 has several components that will not be used and which should be discarded initially. These are the two VT-25 tubes, the two VT-52 tubes, their four sockets, the antenna ammeter, and the side-tone transformer (a black cylinder, located just back of the plug-in coil set). Unless one is fortunate to obtain the female plug to match the power input jack, it is best to replace the jack with another type of connector. An octal socket serves well, although best safety practices indicate the use of a male chassis connector.

Before starting any conversion work, it is well to consider the original wiring diagram, as shown in Fig. 1. In this diagram, T_3 is the tone transformer to be discarded. The 25 mfd capacitor usually is defective and should be replaced initially. Most of the remaining parts will be utilized and should not be removed. The major items requiring change are:

1. The plate tank circuit
2. The modulator bias circuit
3. The tube sockets
4. The heater circuit connections
5. The power connector.

Starting with the first of these, dismantle the 3.9 mc coil set so as to have ready access to the unshielded coil. Unwind the fine wire wound between turns of the heavy wire, then remove the small coil from inside the main coil form; it is easily broken and taken out in pieces. Next unsolder the tap about two-thirds up the coil and move it up to the extreme end of the coil; this will require a longer piece of heavy wire. The full inductance of L_6 now may

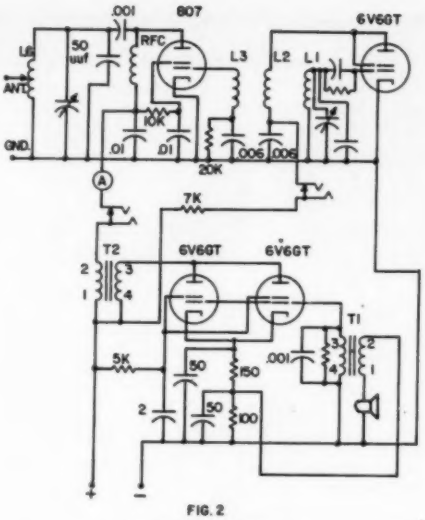


FIG. 2

Simple conversion

be tuned. To resonate without a short, capacitive antenna, however, additional capacitance will be required; so a 50 mmfd, 2500-volt fixed capacitor should be soldered across the whole coil. This is all the conversion needed for the coil set; L_1, L_2, and L_3 are left undisturbed.

Before performing the second enumerated item, it is best to accomplish steps 3, 4, and 5. Replace the four-prong sockets with octal ones, excepting the first one from the front of the set, which should be a five-prong socket for the 807. This socket will have to be dropped about a quarter of an inch to permit clearance for the plate cap of the 807. Wire all the heaters in parallel, and wire in the new power connector. Now you are ready to refer to Fig. 2 for one of the possible new circuits, this being perhaps the most simple.

Starting again with the rf end and working back toward the modulator, the first move is to change over to parallel feed, using a 2.5 mh rf choke and a .001 mfd, 2500-volt capacitor. If you are trustful, you could use the two .006 mfd capacitors for the plate and the screen grid by-pass capacitors, but a higher voltage rating is advisable.

One can either replace the antenna meter with a "two-inch" zero to 100 ma meter or convert the original meter to one by removing the thermocouple, supplying a new scale, and shunting the sensitive movement to 100 ma full-scale deflection. It is strongly urged that one does not attempt to tune the revised transmitter by antenna current.

Having discarded T_3, T_2 is wired in as indicated by the diagram. The resistor labelled 5K may require a bit of experimental juggling of values. The value given worked well for a plate supply voltage of 300 but had to be revised upward to take care of the 475-volt output of a PE-103 dynamotor when used for mobile work.

The microphone secondary circuit is left intact and has a .001 mfd capacitor added across the loading resistor to discourage rf feedback. If there is af feedback, swap over the 1 and 2 connections on the primary.

Note that only a portion of the cathode bias voltage is used on the microphone and that both sections of the bias resistor are by-passed. The capacitors used were 50 mfd each, but any size from 25 mfd up should work well. The screen grid by-pass was 2 mfd, but here again size is not critical.

The tune-up of the revised transmitter is very simple. With an open plug inserted into the PA jack, tune the oscillator with the thumb wheel near the center of the front panel; check the frequency with a receiver, grid-dip meter, or other frequency-measuring device. When on the desired frequency, remove the open plug and rotate the small knob on the extreme left of the panel for plate resonance as indicated by minimum plate current. The degree of plate loading is regulated by the setting of the slider on the plate tank coil. Usually it requires very few turns for full loading; so start out with no turns included initially.

Fig. 3 illustrates a version presently used at W5EHC both for mobile and for fixed station work. Surplus input and output transformers from an aircraft radio transmitter were used, and the two 6C4 tubes were mounted on a small sub-panel situated where the tone transformer originally was located. This method of adding a preamplifier to a push-pull stage fed from a microphone transformer is useful in many mobile installations. Often the microphone requires considerable lung-power for full modulation when no preamplifier is used.

Fig. 4 illustrates a 29 mc version built for W0MGX. Two slug-tuned coils were mounted in the former oscillator coil compartment, the one in the screen circuit being tuned to the crystal frequency (7 mc), and the one in the plate circuit being tuned to the fourth harmonic of the crystal frequency. The original PA plate variable capacitor was removed and original oscillator variable capacitor was used in the plate tank circuit to shorten lead length. Plates should be removed from this capacitor. In two versions of this particular circuit, the

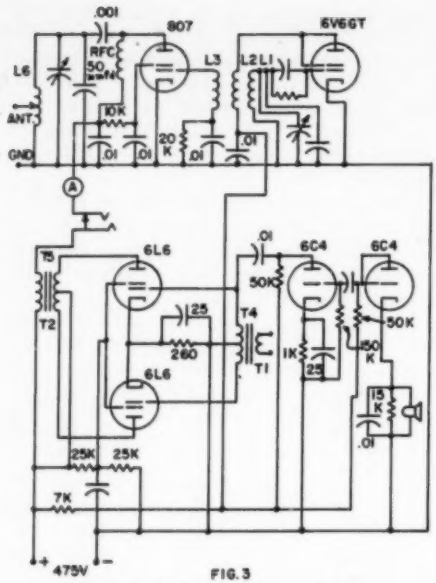


FIG. 3
Conversion for push-pull modulator

author removed the original variable capacitor and replaced it with a 25 mmfd midget mounted on a sheet of insulating material bolted to the front panel; this permitted the use of a direct-drive tuning knob, which facilitated plate tuning.

These circuits by no means illustrate the full variety of conversions readily feasible; the author has used clamp-tube modulation, 6146 finals, and even a crystal-controlled version using a 6V6GT Pierce oscillator and a 6V6GT final.

In Fig. 5 a suggested circuit is shown that makes possible a quick shift between VFO and crystal control. The author has never used this circuit in a BC-230 but has used it with excellent results in other equipment; there is no reason why it shouldn't work well in a BC-230.

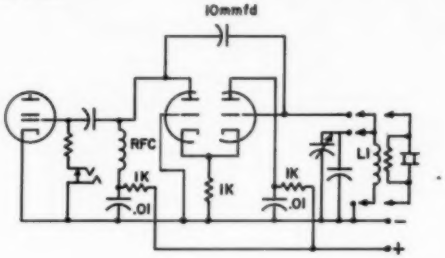


FIG. 5
Suggested oscillator circuit for VFO or Crystal control

If one wanted a really compact transmitter, the circuit shown in Fig. 2, using 25L6 tubes with their heaters in series and with two selenium rectifiers in a voltage-doubling circuit with filters mounted in the space vacated by the tone transformer, permits the entire transmitter to be self-contained.

To get on 7 mc, use the same procedure as for 3.9 mc. For 1.9 mc, however, it will be necessary to add a total of approximately 300 mmfd across the antenna tuning coil in order to resonate the final. Coil sizes for 29 mc de-

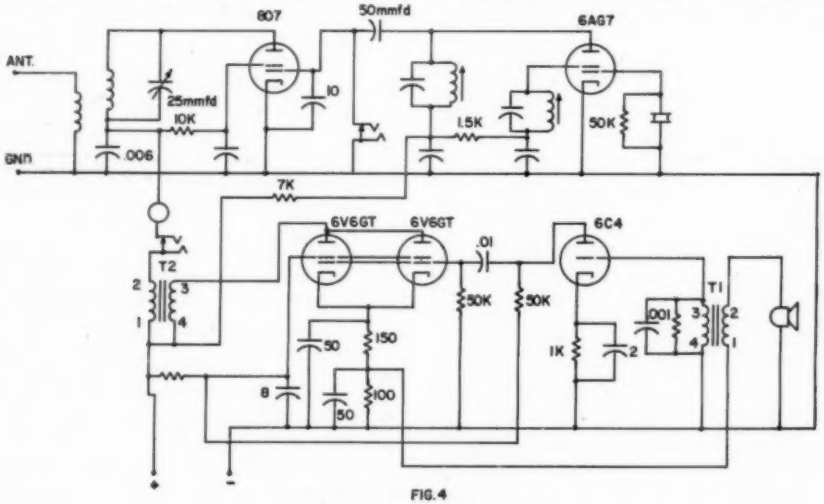


FIG. 4
Conversion for 29 mc

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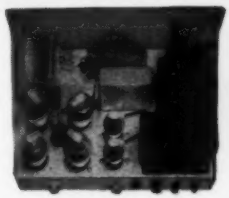

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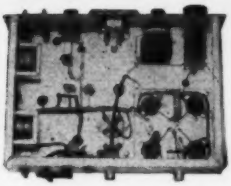

IT'S EASY TO ASSEMBLE AND WIRE — QUALITY THRU AND THRU

The P&H LA-400-C is not an ordinary kit, because a lot of the assembly has already been done for you. The plate transformer, filter choke, plate tuning capacitor etc. are mounted. Plate coil and band switch are assembled and mounted. Output loading capacitor network is assembled; in fact — about all you have to do is mount small parts, mount sockets and finish the wiring. As for performance — just ask anyone who uses an LA-400-C. Just compare his signal with the so-called "talking kilowatts" — it will be mighty hard to tell 3 DB difference. The difference in cost will pay for a good scope, plus a top notch receiver. One other point — Where else can you get a warranty such as P&H gives you on the LA-400-C ?

ONE YEAR WARRANTY ON ALL PARTS AND TUBES !

The 80 thru 10 meter band-switching pi network is designed for 800 watts PEP SSB, 400 watts CW, FM or FSK and 230 watts Linear AM (controlled carrier) or 185 watts (constant carrier) with 50-70 ohm output. Popular 100 watt SSB exciters require no swamping or matching networks to drive the low Z untuned input. Grounded grid circuit uses four 1625's or 837's on customers request. Meter reads RF drive, plate current, RF amps output. New modern compact 9" X 15" X 10½" gray cabinet also contains power supply using 816's. TVI suppressed, Parasitic Free.

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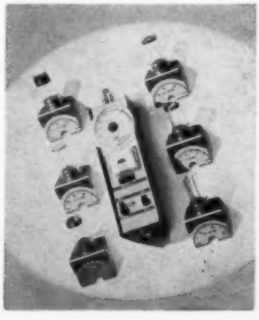
pend upon their associated capacitors; therefore no sizes are given. They are best pruned to size with the aid of a grid-dip meter. Note also that a 10 mmfd capacitor is needed directly from grid to cathode on the PA tube to prevent parasitic oscillation in the 29 mc version. So far, the author has not put a BC-230 on 14 mc or on 21 mc; there is no reason, however, why it could not be done.

Why not give the BC-230 a trial and see what it can do in either fixed or mobile installations? At W5EHC a BC-230 is used on 1.9, 3.9, and 7.2 mc for short-range contacts while the 813 rig stands idle. Not only is it more sport but less interference is caused to other operators. . . . W5EHC

New product



Waters Dippers

Every time you turn around those rascals at Waters Manufacturing have something new for the hams. This is a good deal for us since they put an awful lot of effort into making every product the last word in current technology. Take for instance their just announced "Little Dipper" transistorized radio frequency dip oscillator. You can carry it anywhere and use it without a line cord. This doohinky goes from 2 mc up to 230 mc with seven plug in coils, each of which has its calibration scale attached so it fits under the dial when plugged in. Clever? I'll bet the signal generator companies are gnashing their teeth over the 1000 cycle modulation that is built in. Four little pen light batteries furnish several hundred hours of operation. Price is $129.75, not including the batteries. You'll be seeing these at your distributors.

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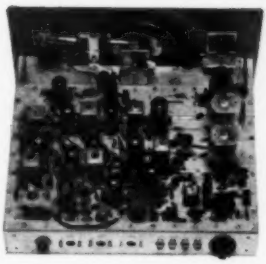

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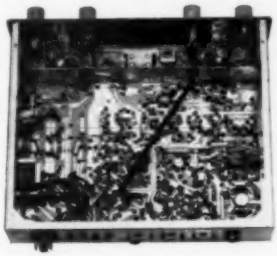

SPECIFICATIONS—RF Input: 200 watts PEP. **Tube Complement:** Fourteen tube heterodyne circuit; (3) 6EA8 mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amps., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12), Het. osc and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc., product det.; (1) 6EB8, Audio amp. and output; (2) 6GE5 R.F. output. **Sideband Generation:** Crystal lattice bandpass filter method. **Stability:** 100 cps overall after warm-up. **Carrier & Unwanted Sideband Suppression:** 45 db. **Frequency Coverage:** HW-12, 3.8—4.0 mc; HW-22, 7.2—7.3 mc; HW-32, 14.2—14.35 mc. **Receiver Sensitivity:** 1 uv for 15 db S+N/N ratio. **Receiver Selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32 USB. **Audio output:** 1 watt @ 8 ohms. **Mike Input:** Hi-Z. **Panel Controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter. Front panel screwdriver adjust for S-meter and VOX delay. **Rear Panel Controls:** Mike gain, tune level, final bias. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, —125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet Dimensions:** 6" H x 12" W x 10" D.

. . . 80, 40 or 20 METERS

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Kit HP-13. DC "Mobile Supply", available August, Price To Be Announced
Kit HP-23, AC Power Supply, available June, $5 mo. **$39.95**

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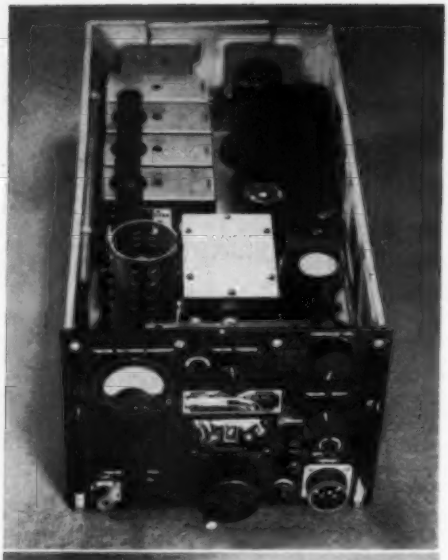
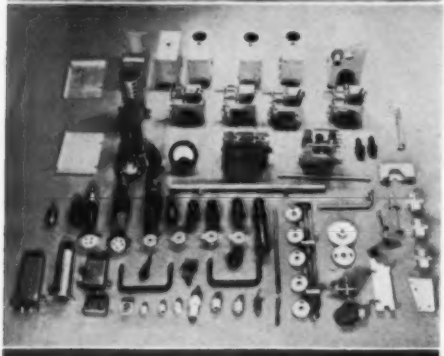




Photography by Morgan S. Gassman, Jr.

Ecdysiasm

for fun & profit

Roy Pafenberg W4WKM
316 Stratford Avenue
Fairfax, Virginia

Since publication of "The Fine Art of Surplus Utilization" in the November, 1961 73, the writer has been on the lookout for equipment which would effectively demonstrate some of the concepts developed in the article.

The RT-45/ARQ-1 Receiver-Transmitter is an airborne countermeasures equipment which covers the frequency range of 14 to 50 mc. The receiver portion of the equipment is a TRF type with a unique tuning arrangement for covering the frequency range in one band. The transmitter output is an 807 stage which is modulated by a 931A photo-multiplier tube used as a noise generator. The unit has a self-contained 400 cycle power supply. This equipment has been on the surplus market for quite some time and is currently available.

While the RT-45 equipment may have potential use as an amateur band receiver-transmitter, very extensive modification and a suitable power supply would be required. However, inspection of the unit reveals many electronic and mechanical components which would be of great value in amateur construction projects. Just about every category of component discussed in the original article is contained in the RT-45. Refer to the photographs as we run down the list.

The turns counting dial, shown in the center of the front panel view, has a salvaged value approaching the surplus cost of the complete unit. The dial was removed, disassembled and given a coat of flat black spray lacquer. The two other photographs show the refurbished dial mounted on a small sub-panel. This dial is ideally suited for use with rotary inductors and vacuum-variable capacitors.

The various gear drives, some of which are shown in the under-chassis view, separate readily and can provide an easy and economical answer to some of those difficult transmitter layout and construction problems. These gear drives are shown arranged in approximate mechanical relationship in the photograph

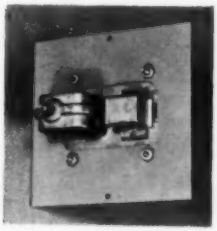
of disassembled components. Also shown in this photograph are the various insulated couplings and both solid and flexible shafting used in the equipment.

Those small units shown toward the rear of the photograph of disassembled components are an education in themselves. Each of the five units shown has a spirally slotted drum ganged to the shaft of a variable capacitor. A slug tuned inductor is mounted inside each of the assemblies and a projection of the slug drive engages the slotted drum. The net result is a tuned circuit that covers the range of 14 to 50 mc in 180° shaft rotation and which, at the same time, maintains optimum LC ratio over the complete range. Each unit also contains the tube socket and the balance of the components required to provide a complete rf stage.

The RT-45 contains a variety of remarkably "clean" aluminum shield cans, plates and boxes that are directly usable in amateur construction projects. Other usable mechanical parts shown in the photograph of salvaged parts is a super-deluxe 807 shield, panel handles and brass tubing used as shielding in the equipment. Not shown is the sizeable collection of quality hardware that resulted from the stripping operation.

The 931A photo-multiplier tube is a natural for the ham TV man. This tube comes complete with socket and a special die-cast enclosure which is shown to the left of the meter in the photograph of components.

So far, we have discussed only special components. As the photographs show, the RT-45 contains the usual assortment of usable, conventional components. The 0-200 ma meter is a valuable item and the tube line-up, while not spectacular, will serve to augment your stock of old faithful types. The equipment, in addition to the 931A, uses a complement of 6AC7's and one each 807, 2X2A, 5R4 and 6AG7. Only a representative sampling of the smaller parts is shown in the photograph. By using care in disassembly, the usual collection of resistors, capacitors, terminal boards, rf chokes and other parts may be salvaged.



While the RT-45 is a bit different from the usual run of surplus equipment, the salvage operation is routine. Use care to avoid damage to parts, devote a little extra effort to dressing up the really valuable items and give your imagination free rein on possible uses for the often unique components you salvage. Discard those items you can see no possible use for and really clean up those you plan to retain. Then, most important of all segregate and store your salvaged parts as if they were worth their weight in gold. After all, some of them are!

. . . W4WKM

Letters

Dear Wayne:

Since it looks like you are getting hard up for letters to print in 73, I thought I would take a few minutes from my busy schedule and dash off one to you. What makes me think you are hard pressed for letters? Easy — when you print the same one twice and in issues almost a year apart, you must want more letters.

I'm referring to the letter from Jim Whitfield, K6BHN that I first read in the May '62 issue of 73 — and I might say a fine letter it was — but my eyebrows raised a bit when I read it again, verbatim, in the April '63 issue. Could it be that you run Jim's letter once each year as an anniversary type thing; or is it possible since this is April that you have pulled a little goodie on us?

Whatever the reason may be, feel free to print this as many times as you like. In fact, after each rerun of K6BHN's letter, you could follow with this in the next issue.

Horace Paul W4LCO

Dear Wayne:

Since it looks like you are getting hard up for letters to print in 73, I thought I would take a few minutes from my busy schedule and dash off one to you. What makes me think you are hard pressed for letters? Easy — when you print the same one twice and in issues almost a year apart, you must want more letters.

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Horace Paul W4LCO

Dear Wayne:

Recieved today my CHC certificate, and I hate it.

True to the high principles of the Club, immediately on receipt I crumpled the certificate and tossed in into a dusty corner of my closet, where I can hate it at a safe distance.

It is a dreary, badly-printed, clumsily-worded, illegibly-signed, mis-numbered, wrongly-dated, smeared and fortunately almost unreadable document.

Every amateur should have one.

Ad astra per CHC,

Charles Leedham
CHC #999,999
WA2TDH

A Beginner's Receiver

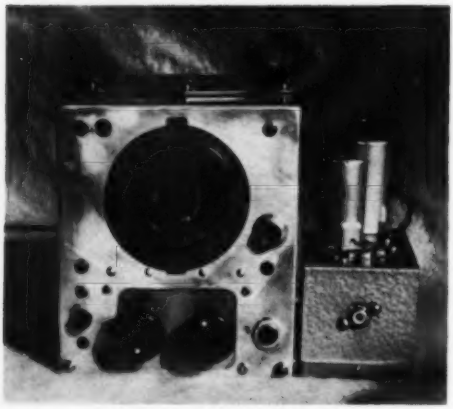
The BC-453

Dick Gridley K6JHJ
Edison Powerhouse #8
Auberry, California

If one piece of surplus equipment could be singled out as the most written about, most modified, and still one of the best buys on the market, it would have to be the BC-453 navigation receiver, or the so-called Q-fiver. The following article is meant to be one more to the credit of this little gem.

The construction of this unit came into being because of the question asked by each new crop of Novices. "Where do I get a receiver that will perform like the $300 one for $30?" No claim is made that this unit will do all that a super-duper inhaler will, but it will give a surprising account of itself on the band it is used.

The heart is, of course, the BC-453. When finished, it will be a tunable *if* of .19 to .55 mc having a band pass of approximately 3 kc at the 6db points and uses a simple but very effective product detector. Best of all, with a little shopping, the total cost with one converter should not exceed $30. Several advertisers in this magazine have the BC-453's for under $15. It is advisable to get a schematic at the same time, most suppliers have them for $1.00.

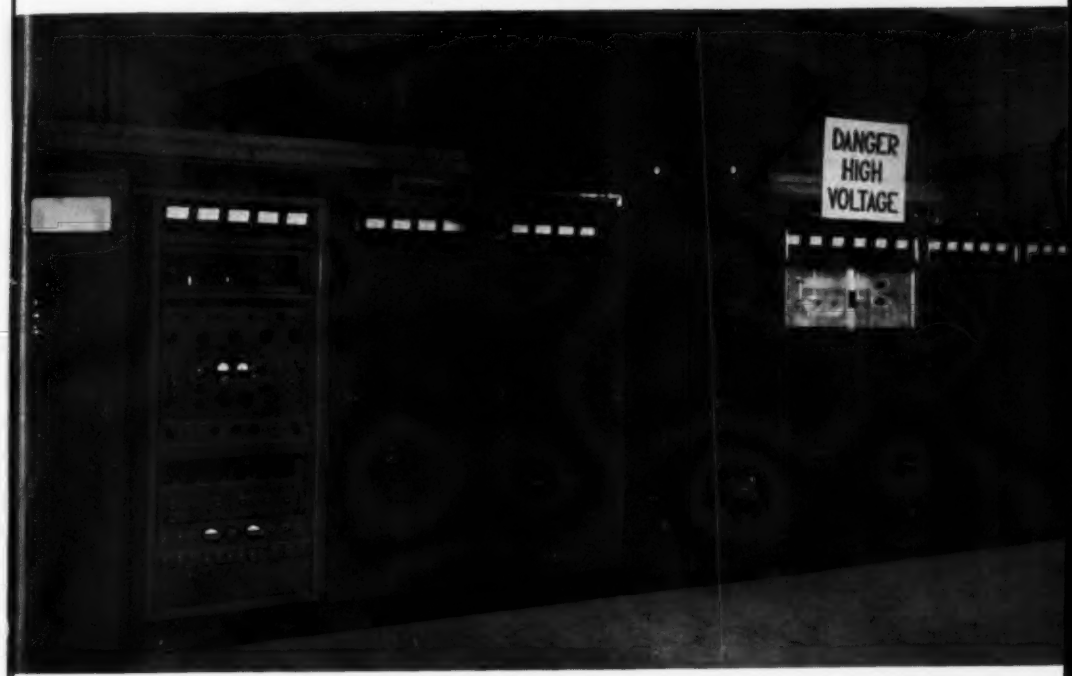


Completed unit

As you strip the unit, save all the parts. Some of them will be used later. Remove the top and bottom covers and remove the tubes. Remove the *if* transformers, marking them so you can return them to their original location. On the bottom side—remove all the condensers, chokes, and the output transformer. Remove the two screws holding the ant., rf and osc coil assembly and lift it out. Remove the bfo coil, marking the terminals GRID, PLATE, and B-PLUS. The wiring of the rf stage and the osc stage will be left alone so do not disturb these wires. Remove the plugs in the front and rear of the unit (J1 and J3) and their associated wiring. The one wire that will be saved is the sensitivity line running to the front. Remove the rest. Remove R22 and R23. These are the two 10 watt resistors standing vertically in the rear portion of the receiver. Do not remove the mounts as they will be used later. Take out the dynamotor plug and mounts. Remove the tube sockets for the first *if*, bfo, det., and the audio output tubes. Remove the associated wiring and resistors. Completely remove the resistor board next to the audio stage. Remove the grid biasing, (100K & 150K) and the 200 ohm resistor from the resistor board next to the 12K8. Looking at Fig. 1, the three resistor boards left are referred to as RB1, RB2, and RB3. RB1 should have the original four resistors: a 200 ohm, a 620 ohm, a 360K ohm, and a 200 ohm. RB2 should have only one resistor of 620 ohm, the 12K8 cathode resistor. RB3 has two resistors left: a 510 ohm and a 200 ohm. This com-

GPT-200K

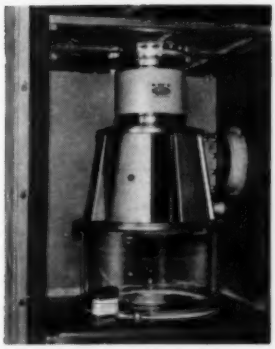
200 KILOWATTS



(AN/FRT-62)

This is a complete general purpose transmitter providing SSB, ISB, AM, compatible AM, CW, FSK and FAX modes of operation. Accuracy and resetability is 1 part in 10^8 per day with tuning in 100 cps steps from 2-28 mcs.

Conservative ratings provide reserve power for maintaining peak power under conditions of complex waveform transmission, such as 64 tone voice frequency modulation, while adhering to signal to distortion ratio of at least 35 db. The final amplifier in the GPT-200K is air cooled. This transmitter is capable of 20 kc bandpass at the 3 db points.



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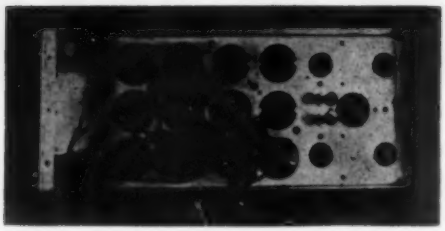


Stripped Chassis

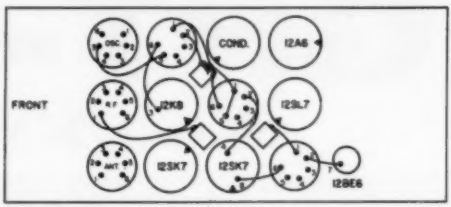


FIGURE 1

Bottom view of chassis.

pletes the stripping on the bottom. Next, remove the cover protecting the three gang tuning capacitor. Above the antenna section you will see an 11 mmfd capacitor connected between the antenna section and the antenna post—clip it out, leaving the leads as long as possible. Remove the antenna post. When stripping the bottom side you pulled a 120 mmfd capacitor from pin 8 of the rf tube and one section of the 3x.05 capacitor that was above it. This 120 mmfd capacitor can now be installed in the top section. Mount it between terminals 5 & 6 of the rf coil (Fig. 1) on top of the chassis, it will fit nicely against the bracket that holds the protective cover. Be sure that the tuning capacitor will clear. It is best to run it through the range to be sure. Finally—drill out the dynamotor bumpers. This should leave a flat surface on the rear deck. Remove the neon lamp across the antenna trimmer condenser C2. This completes the stripping.

The next step is one of pride only, but the author feels it is well worth the effort. That is, to polish up the *if* cans and chassis. S.O.S. works fine. For the *if* cans, remove the covers. Once again be sure that the transformers are marked on the bottom before removing the covers. The BFO coil cover has to be removed anyway, so polish it up too. If your BC453 has an aluminum chassis it also should be worked over, keeping the water out of the tuning assembly. If the unit is black crackle, detergent suds do a nice job with a stiff brush. Clean up the three sockets, the four 3x.05 capacitors, the resistor board and the output transformer.

Reassembly

First cut an aluminum plate to fit the hole on the front where J1 was removed. Cut this plate just large enough to cover the hole—two 6-32's hold it in place. Cut an aluminum plate to cover the rear deck and put a 6-32 in each corner. The first step in wiring is to parallel the filaments of the three tubes that are left. Check the four 3x.05 capacitors. This

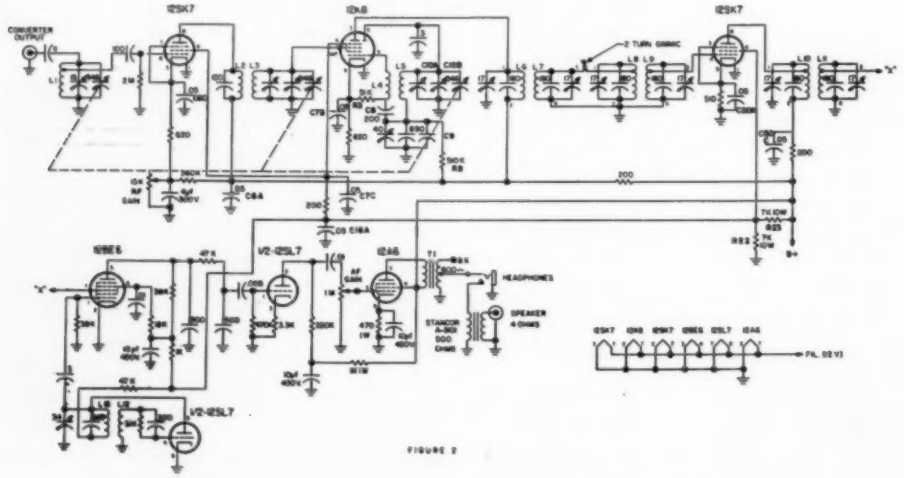
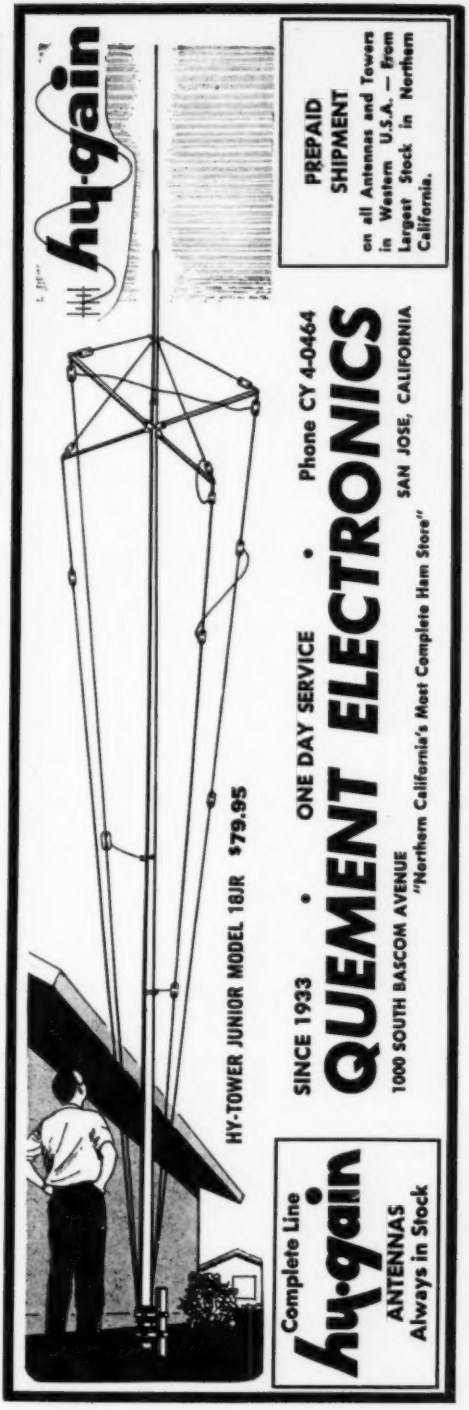


FIGURE 2

Note: R3 R6 C10A C10B C9 and C8 are inside osc coil and in tuning assembly.

can be done using a high resistance scale on a VOM. These condensers are 15 to 20 years old—some of them leak, and leaking condensers we don't need. Taking two of these units that are OK, mount them on their original mounting spots—one over the rf tube socket, and the other over the second *if* amplifier socket. Connect these six sections of the two condensers as shown on Fig. 2. The "C" numbers correspond to the original schematic. The front condenser is used for C6A, C6C, and C7C. The second one is used for C16A, C20A, and C20C. The cathode bypass on the 12K8, C7B, was replaced with a tubular .05 at 400v. This was done only to save space. You can mount one of the 3x.05 capacitors that is left and use one section, but it is a lot better for working around, etc., to use a tubular. Also, for the sharp boys—C16A was originally a .22. However, to save space one section of the rear 3x.05 capacitor was used and it proves to be adequate bypassing. Mount the rf gain control potentiometer, audio gain potentiometer, and the phone jack on the front panel. Hook up the rf control as shown in Fig. 2. Next, hook up the *if* transformer wiring as shown in Fig. 1 & 2. No attempt was made to make a complete drawing in Fig. 1, the wires to the osc. coil and the 12K8 are only for reference. The B-plus lead that ties to lug 5 of the second *if* transformer will have to be removed and made solid between RB2 and RB3. Referring to Fig. 1—make up the gimmic between the first and second *if* transformers. A wire is run from pin 2 of the first *if* transformer to one of the unused terminals of RB2, and from pin 6 of the second *if* transformer to the terminal opposite. Be sure that the original ground wire is removed from RB2. Insert about a one inch piece of plastic coated solid wire in each of these terminals and solder. Twist the two wires together and cut them off so that a two-turn twist is left. Paint the gimmic with clear dope or fingernail polish to help hold it in case of jarring or hitting it while finishing the project. Install the three octal sockets with the keys as shown in Fig. 1. Mount a lug near C2, the trimmer capacitor, and connect the 11 mmfd capacitor (that was removed from the antenna post) between the stator of C2 and this lug. Directly to the rear of and in alignment with the third *if* transformer, drill and punch a socket hole in the old dynamotor mount for the 12BE6. Mount the socket with the key as shown in Fig. 1. The unit should now correspond electrically with Fig. 2. This is a good place to stop and double check all that has been done.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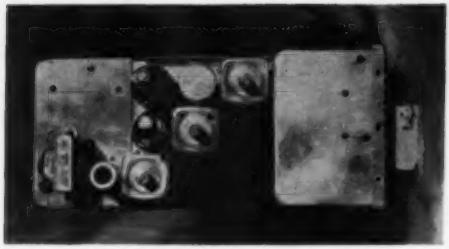


Completed unit-top

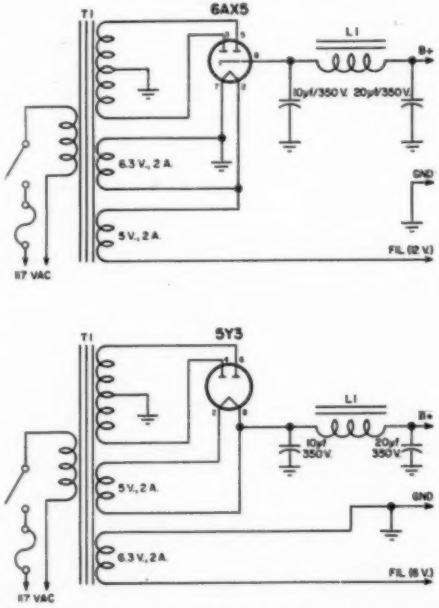
The rest should be easy—from the schematic Fig. 2, and the photos. A couple notes first before installing the bfo coil. With the cover off, open the plates on the trimmer inside the coil to the ½ meshed position. Put the cover back on and mark this position on the cover. Second, there are two types of output transformers (T1). The one with the 600 ohm winding has the terminals marked as shown in Fig. 2. The one without the 600 ohm tap does not have a terminal #6. If you don't intend to use phones, a standard output transformer can be used in place of T1. The condenser used for filtering is not critical, however, do not use less than 10 mfd. I had a 3x10 mfd at 450v octal mount condenser in the junk box—that is the reason the 12A6 cathode capacitor is 450v. 25v will do nicely here. Another decision that will have to be made is whether to go 6 or 12v filament. For 12v filament, you have to buy two tubes, a 12SL7GT and a 12BE6. To go 6v filament, you will have to buy 5 tubes. The additional cost is about $5. There are direct replacement 6v types for all but the 12A6. A 6V6GT does a nice job here.

For a tuning knob—most radio suppliers have a universal ¼ inch plastic knob that is used on TV tone controls, etc. Most of them have a long shaft and can be cut down to fit. The resistance terminal board that was removed and cleaned is returned to its original location and used for the audio stages—one side for the audio and the other for B-plus. The audio wiring on the 12A6 is done before the bfo coil is returned, otherwise it will take long, skinny fingers. How the rear chassis apron is arranged is not critical. The way that I have been doing them is to mount an octal socket in the hole left by J3. Then on the side opposite the bfo coil and output transformer, drill a ¼ hole in the apron as close to the top corner as possible for the antenna lead. Mount an RCA phono jack also close to the same side but about center between top and bottom. Then, close to the octal socket, drill a hole for a rubber grommet. A short piece (about 15 inches) of RG-58 A/U is connected to the 11 mmfd capacitor attached to C2 and brought out through the ¼ hole—This is the converter input. The 4 ohm winding from the A8101 line to voice coil transformer is connected to the RCA phono jack for the speaker. A three-wire power cable is run through the grommet and connected to any three lugs on the octal socket. Be sure and ground the ground lead to the chassis. This octal plug is now a power plug for the converters, and the inside lugs are the common tie points for the BC-453. Return the cover of the tuning assembly, the *if* transformers, and install the tubes. Remove the top covers on the *if* transformers by unscrewing them, and pull the coupling rods all the way out for minimum coupling. Return the covers. This completes the assembly and you are now ready for alignment. But first it is best to double check everything you have done before applying power.

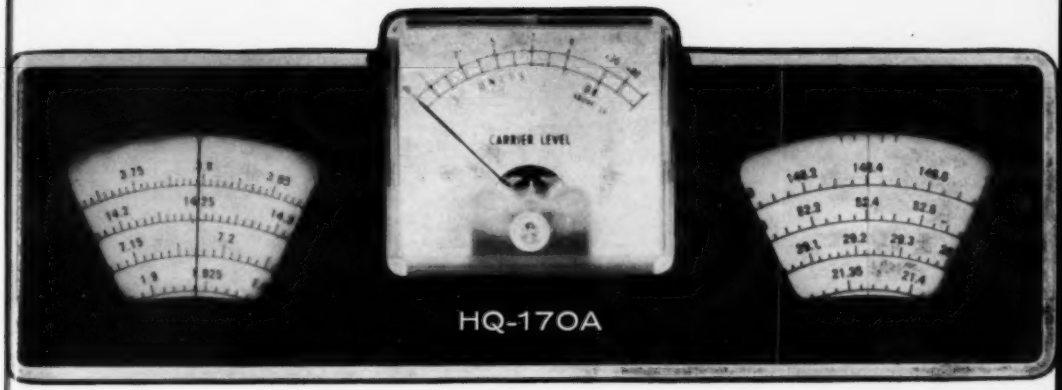
Power

The converted unit draws 60 ma B-plus at 250 vdc and 12.6v at .1 amp . . . Two ways to come by this is shown in Fig. 3. This is where

FIGURE 3



T1 500 to 550 volts ac center tapped 80 ma
L1 6 hy 80 ma filter choke
Note: No bleeder is used as R22 and R23 present a load of 14K ohms at all times.



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Completed unit-bottom

you must shop around to save money. There are many good power transformers and chokes available on the surplus market. If you buy new components for a power supply, the price will be costly. The voltage is not critical, anything between 225 vdc and 275 vdc will do. With a single converter, the total load is 75 ma—so a total load of 80 ma is all that is required.

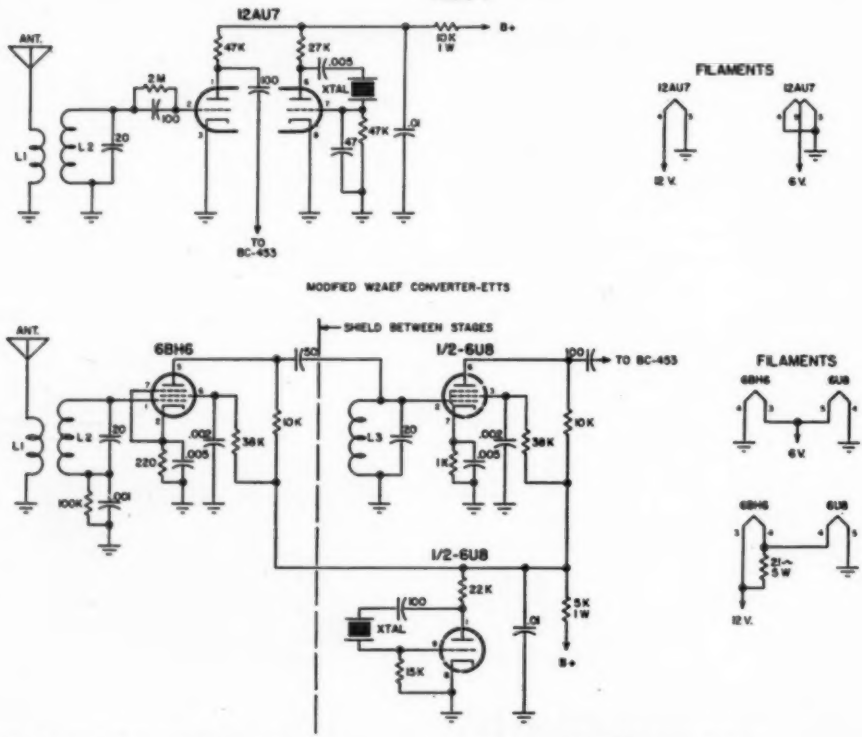
Check-out and Alignment

Connect a speaker or phones to the unit and apply power. Turn the rf gain wide open and advance the audio gain until you hear noise. The ambient noise level of this unit is quite low but you will hear a definite gain if you connect an antenna to the coax that will connect to the converter. The ultimate alignment is done with a scope and a low frequency sweep generator, using the bfo frequency as a marker for the center of the band pass. The sweep and the marker frequency being introduced at pin 5 of the 12K8 with pin 8 grounded, and an rf probe feeding your scope from pin 7 of the 12BE6. Using this method, a band pass of 3 kc at the 6db points can be achieved.

Knowing most shacks do not have a low frequency sweep generator and some don't have a scope, two other methods are offered—either will perform satisfactorily. If a VTVM is available, remove the 5 mmfd capacitor from pin 1 of the 12BE6. Ground pin 8 on the 12K8 mixer tube. Connect a piece of wire to the 5 mmfd capacitor and connect the other

CONVERTERS

FIGURE 4



L1 4 T wound on ground end of L2
L2-L3 Coils wound to frequency on ¼" x 2" form with #30 enameled wire
Crystal: 80M-3.5mc, 40M-6.8mc

end to pin 5 of the 12K8. Apply power and with an rf probe on pin 7 of the 12BE6, peak the *if* transformers for maximum voltage. Remove the ground on pin 8 of the 12K8 and the wire to pin 5. Reconnect the 5 mmfd to pin 1 of the 12BE6. Move the bfo trimmer ¾ turn in either direction.

If a VTVM is not available, a satisfactory way is to apply power and connect an antenna wire to the RG-58 A/U converter input. Turn the af and rf gain until you can hear static noise. Check to make sure this is coming in the antenna by taking off the antenna wire and the noise should drop off. Hook the wire up again and peak the *if* trimmers for maximum noise. Next, move the bfo trimmer capacitor about ¾ of a turn in either direction. This completes the conversion.

The Converter

Any pet converter will work fine with this rig—some fellows have used single tube converters with good success. The one I recommend is the old standby W2AEF Converterettes. Two suggestions are offered in Fig. 4, but any converter with the *if* frequency of the BC453 will do. Both are built on 4"x2¾"x1¾" chassis (Bud Minibox).

Conclusion

Once completed, the unit is a nice piece of equipment well worth having. It makes a dandy stand-by receiver and if you purchase a receiver that is quite broad, this unit can be used as an outboard *if* to sharpen it up. If you want to demodulate SSB, all you have to do is line up on a SSB station and trim the BFO coil to the correct side of the band pass for good sounding signals.

A lot of equipment for a minimum investment. I hope you enjoy yours as I do mine.

. . . K6JHJ

Sign in the shack of K7GPZ:

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ACHTUNG! Alles lookenspeakers in das hamschacken: Das radiomachinen is nicht fur gefinkerpoken. Und mitten graben. Ist easy schnappen der springenwerk, blowenfusen und poppenkorken mitt spittszensparken. Ist nicht fur gewerken by das dummkopfen. Ich have license from der Sammy Unkle. Running das radiomachinen by dummkopfen mittout license makkin hoosegow geput or marks gepayen. Das rubbernakken sightseer keepen hands in das pockets. Relaxen,—to das goofy sprechen gelisten, un das bouncing meterish pointer gewatchen.

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Power Tuning

Ronald Ives
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With the very low tuning rates of many modern receivers, the labor of tuning from one end of the dial to the other is considerable. If, as is often done, a subsidiary planetary drive is added, the operator may come down with "nailer's wrist" as a result of tuning across the band too many times in succession. What is needed here is a simple motor drive to save wear and tear on the operator's wrist.

Only a few modern receivers are so designed that a Zenith remote tuning mechanism can be added, and fewer yet can accommodate the power tuning mechanisms furnished as integral parts of some military receivers, such as the R-44/ARR-5 and the R-54/APR-4. Construction, "from scratch" of a motor tuning drive seems beyond the facilities available to most operators.

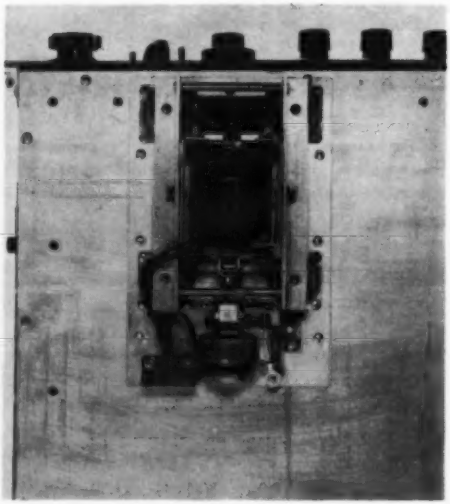

Fig. 1: Motor drive mounted on bottom plate of receiver.

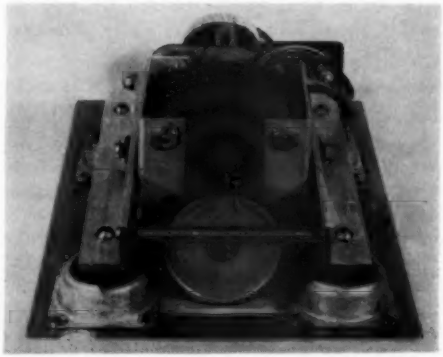

Fig. 2: Drive wheel and motor mounting. Note window in bed plate so that drive wheel can contact tuning flywheel of receiver.

Happily, most modern receivers are provided with flywheel tuning, and the rim of the flywheel, in many instances, is very close to the bottom of the chassis. In consequence, a friction drive can be coupled from below without requiring major surgery on the receiver. Some experimentation shows that a combination drive and clutch can be constructed successfully from standard components, without requiring any critical machining, close fitting, or "persnickety" alignments. View of such a drive, mounted on the bottom of a receiver, is shown in Fig. 1. Requisite parts are a motor, a relay actuator, and a hatful of small inexpensive parts.

In this power drive, the motor is mounted on gimbals, and is equipped with a rubber-tired drive wheel (a 2" o.d. Webcor idler wheel) on one end, and an electromagnetic tilting mechanism (Leach type 957-V impulse relay magnet) on the other. When the electromagnet is not energized, the drive wheel (Fig. 2) is held away from the receiver tun-

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ing flywheel by a spring. When the electromagnet is energized, the whole motor assembly tilts forward, contacting the tuning flywheel, and driving the receiver tuning mechanism.

Practical consideration of desired tuning rate, power needed, and type of motor control desired led to the choice of a 360 RPM capacitor start and run motor, with a torque of 2.6 inch-ounces (Bodine type KYC 26). This was equipped with two C-shaped side plates, in the centers of which the gimbal pivots were mounted. These, in turn, were supported by a cage, made from aluminum angle and threaded spacers. This assemblage was fastened to the bed plate with rubber shock mounts, which give the system the requisite degree of "slop," so that precision machining is not needed in its construction. Details of construction are shown in Fig. 3.

The electromagnetic actuator, with its integral bell crank, is mounted on the bed plate

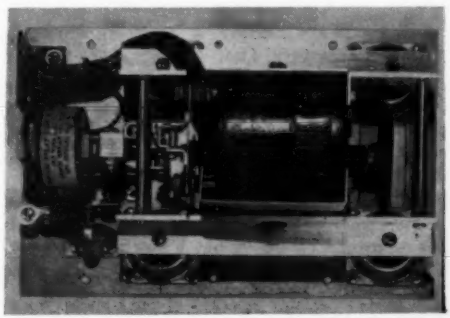

Fig. 3: Completed motor tuning drive, demounted from receiver.

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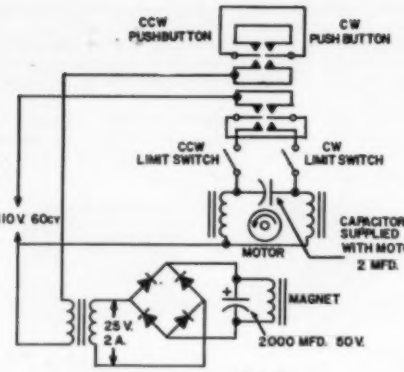

FIG. 4

Fig. 4: Power tuning control circuit.

behind the motor, and coupled to it with a pivoted push rod. This attaches to the motor by means of a bridle, held in place by two of the motor case screws. Adjustment for smooth operation is greatly facilitated if the push rod is slotted, so that the degree of engagement of the drive wheel with the tuning flywheel can be adjusted, and system wear compensated for from time to time.

With this adjustment, plus the systemic "slop" provided by the rubber shock mounts, smooth operation can be attained without the need for close machining of the parts. So long as the general principle of operation is followed, exact construction can be modified considerably to suit the materials and components available.

Electrical control of this power tuning drive can be as simple, or as complex, as the user desires. For ordinary tuning, push-button controls seem optimum, with one button for clockwise rotation of the tuning drive wheel, and a second for counter-clockwise rotation. One of many circuits which perform this control function is shown in Fig. 4. Here, a two-circuit push button energizes the motor for one direction of rotation, and also actuates the magnet circuit, which couples the drive mechanically to the receiver tuning mechanism. The interconnections of the push button arms are intentional, and prevent trouble in the event that someone pushes both buttons at once. If that is done, nothing happens!

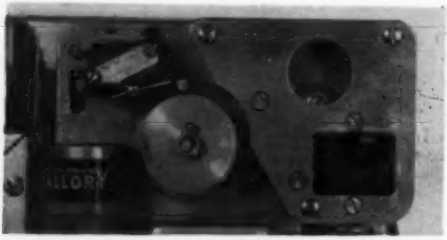

Fig. 5: Limit switch mechanism.

The purpose of the limit switches shown in Fig. 4 is to prevent damage to the tuning machanism when the end of a tuning range is reached. These, as here applied, are a system of cams and microswitches (V-3 switches with JV-20 actuators), coupled to the tuning shaft, and wired to cut off each direction of rotation at the end of its range. Such a limit switch mechanism is shown in Fig. 5. There are two cams and two switches in this figure. Electrical connections are made by means of the Jones plug at the right center of this figure. Cams are made from defunct brass gears, with the slots hand-filed to desired dimensions.

Service life of this tuning mechanism is problematical, as it outlasted the receiver for which it was built (8 years). With new rubber shock mounts, and a new tire on the drive wheel, it could well last another decade of service. Maintenance needs during this time included only the replacement of a selenium bridge rectifier in the magnet circuit. Modern silicon rectifiers in the same current range are apparently immortal, so that this trouble should not recur.

. . . Ives

An Inexpensive Beam Rotor

Bill Hurni K1SDR
175 Raymond St.
Darien, Conn.

Have you got a tower, a beam, and no cash to buy a rotator? That happened to be my situation until about two months ago. At that point I'd had it. I decided there must be some way to construct an inexpensive yet practical antenna rotator. A little shopping, a little work and the expenditure of about fifteen dollars produced the result.

The rotator is constructed around the top hat of an E-Z Way tower. The assembly is so simple that it can be adapted to any tower. It has positive braking and 320 inch pounds of torque at about ¾ RPM.

The parts in this rotator weigh five pounds.

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They are itemized below along with the prices for those skeptical about the fifteen dollars.

Worm gear (Astrup)	$5.00
Surplus motor Cat# 441-1008 24vdc	$5.95
Rotor cable	$1.65
Machine work	$1.30
Transformer	$1.00
	$14.90

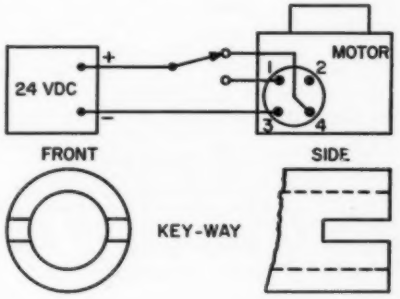
A picture is worth a thousand words so before proceeding study the one included.

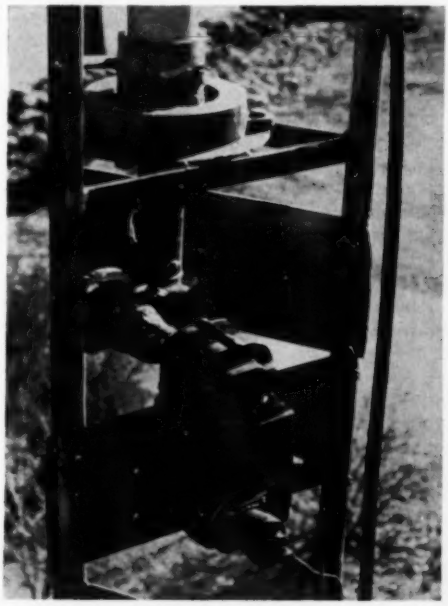
The worm gear was obtained from a local awning shop. These worm gears are normally used in the crank operated mechanism for raising and lowering the large awnings on store fronts. They are easy to come by.

The motor is a surplus 24vdc job cat# 441-1008 purchased from Fair Radio Sales in Lima, Ohio. It includes an integral right angle drive, gear reduction unit. This particular motor seems to be designed for out door use since it is completely sealed.

Only a few notes on construction are necessary. The rotator is assembled directly into the tower. When building the rotator into the tower it is of the utmost importance that all of the joints are free and that there is no binding. This is a question of alignment, for example, between the worm gear and the antenna mast or the worm gear and the motor.

This alignment is easily accomplished. The worm gear is mounted on a suitable piece of aluminum plate a little longer that the width





of one side of the tower. This assembly is temporarily clamped into its approximate position on the tower with "C" clamps.

Fine adjustment of the connection between the worm gear shaft and the antenna mast is then made by juggling the aluminum mounting plate around until the two shafts are aligned and turn freely. The "C" clamps are then tightened to hold the mounting plate firmly in place. It is then a simple matter to drill the mounting holes through the aluminum and the tower.

If the same procedure is followed with the motor, no difficulty should be encountered in alignment of the rotator.

The diagram of the key-way needed to connect the motor to the worm gear is self explanatory. The key-way, which is cut into the worm gear shaft, can be done at a machine shop for a nominal fee.

The power supply for the motor is a simple full wave 24 vdc unit. The motor draws approximately .8 amps in operation. The diagram shows the way in which the power supply is wired to the motor. The positive lead is switched to pin 4 for clockwise rotation and to pin 1 for counter clockwise rotation.

At my QTH an indicator was not necessary but a pair of surplus selsyns could be added with no difficulty.

After you have assembled the rotator, pack all the joints with heavy grease and put the assembly on your tower. I am sure that you will be as satisfied with your rotator as I am with mine. . . . K1SDR

The Lazy Man's CW Monitor

Al Singer WA2WFW

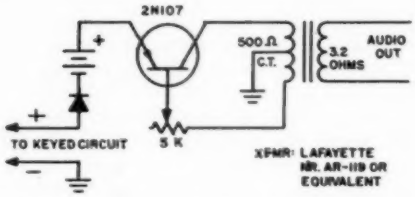
The circuit shown below is the simplest possible form of a CW tone I've run across. I'm sorry I can't take credit for the design of this circuit; I heard it being described over the air on 20 fone, and the bug bit me to build it.

The resistance range of R1 should fall between 1000 and 5000 ohms. A fixed resistance may, if so desired, be substituted.

Almost any transistor may be used, as the whole circuit is powered by a penlite cell. The diode assures the transistor's safety, by protecting it from the current found across the key jack.

The audio output transformer is just about the most expensive part in the whole gadget. It is used to match the 500 ohm output impedance of the circuit to whatever you happen to be driving. The audio output is sufficient to drive a speaker. The unit has been used as a code practice oscillator to instruct a rather large group. No complaints were voiced as to the volume.

One word about the diode, though. Make sure it has a sufficient PIV and current rating so that if placed across your key backwards the diode's backward conductance will not be



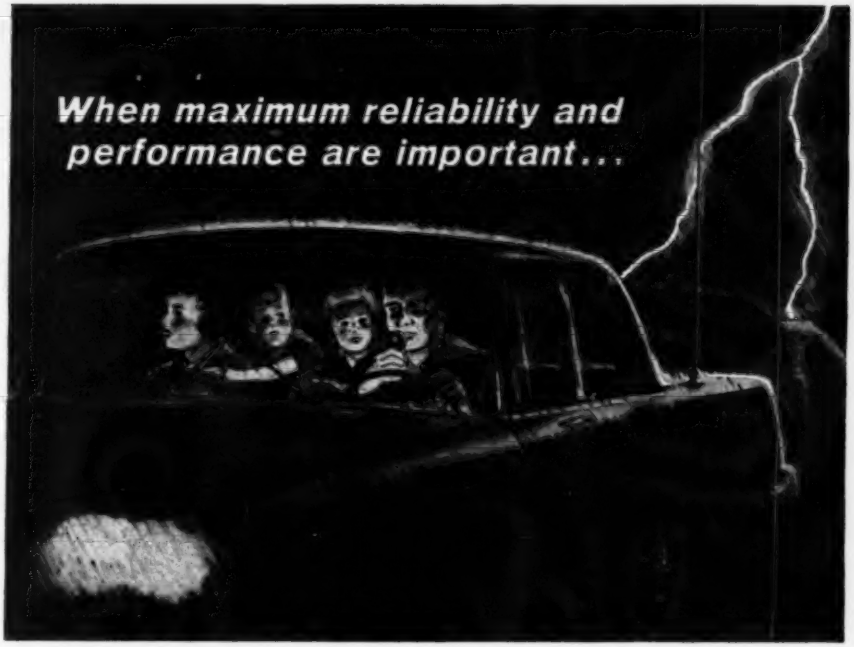
great enough to put a signal on the air.

People with homebrew keyers might want to build this unit into the keyer for a sidetone generator. I preferred to build it right into the rig, so that can monitor myself when using the old bug. I'm sure many of you can find a use for this cheap little gimmick.

. . . WA2WFW

Parts Kit Available

The parts for this unit catalog at $4.62. They are available as a package thru the 73 Parts Kits Program at only $4.25, complete. See info on kits on page 123. Order WA2WFW Kit.



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*It is acknowledged that to attain maximum efficiency from installing a loading coil in an antenna, the loading coil must be installed at or near the top of the antenna. By loading the top of the antenna, the efficient current section of the antenna may then be left at natural length. Top loading also raises the feed point impedance from which a superior transfer of energy results, because of the small diameter of the loading coil, top loaded antennas offer the additional advantage of superior mechanical reliability.

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A Deluxe Conversion of the Command Set Antenna Relay Unit

The BC-442

Roy Pafenberg W4WKM
316 Stratford Avenue
Fairfax, Virginia

Photographs by: Morgan S. Gassman, Jr.

Antenna Relay Units BC-442, used in Radio Set SCR-274-N, and RE-2/ARC-5, used in Radio Set AN/ARC-5, are widely available on the surplus market. While not too popular in the past, these versatile little units give you a lot for your money. This article presents a de luxe conversion of these Command Set accessories which has several advantages over those previously described.[1] This conversion features commercial appearance, low cost, calibration data, push-to-talk circuitry and a unique relay power source and circuit.

The photograph shows the AN/ARC-5 version of the Antenna Relay Unit as you will find it at your surplus dealers. Figure 1 shows the schematic diagram of the SCR-274-N version. Major components of these units consist of a 0.75 ampere rf ammeter with external thermocouple, a powdered iron core rf transformer to couple the thermocouple to the antenna circuit, a 28 volt dc antenna change-over relay and a 50 uuf fixed vacuum capacitor. In this conversion, the meter, thermocouple and relay are used for their original purpose, the antenna transformer is discarded and the vacuum capacitor regarded as a bonus and retained for future projects. To improve the appearance, the unit is stripped and the components assembled in a commercial, sloping front case.

The meter, M50 of Figure 1, is an expanded scale dc millivolt meter with an open circuit, full scale rating of 19.5 millivolts. DC resistance of the meter is three ohms. While the meter has an arbitrary scale calibration of

The completed station rf accessory unit using Command Set Antenna Relay Unit components.

The RE-2/ARC-5 Antenna Relay Unit as used in the AN/ARC-5 Command Set installations.

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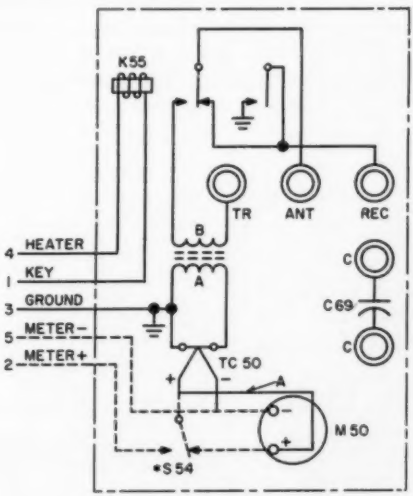
0 - 10, the range of the meter when used with the thermocouple, TC50, is 0 - 0.75 rf amperes. A test setup was made, using an rf ammeter of verified calibration, an rf vacuum tube voltmeter and a flat 50 ohm load. RF voltmeter and ammeter readings were averaged to obtain the following data for the meter and the thermocouple:

METER READING	RF AMPERES	WATTS/50 OHMS
1	0.12	0.72
2	0.18	1.62
3	0.22	2.42
4	0.26	3.38
5	0.32	5.12
6	0.37	6.84
7	0.43	9.25
8	0.50	12.50
9	0.59	17.41
10	0.75	28.12

Spot checks disclosed little variation in readings over the frequency range of 3.5 to 60 mc. While the basic 0 - 0.75 ampere range is a bit low for most amateur use, it does meet many shop and on the air requirements. Tests were conducted and it was found that the thermocouple could be satisfactorily shunted to increase the full scale range. The antenna change-over relay, K55, is capable of handling considerable power so it was decided to incor-

1 See pages 16 and 17 of "INDEX TO SURPLUS," W4WKM; available at $1.50 from 73 MAGAZINE.



ANTENNA RELAY UNIT
BC-442-A

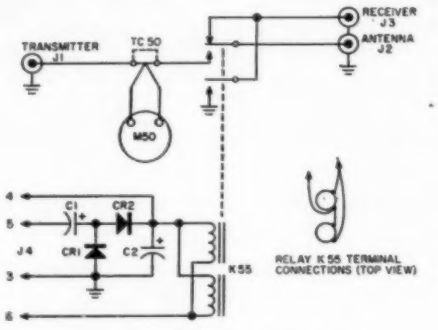
FIGURE 1

* Note on S 54. S 54 and connections shown in dashed lines were provided in earlier models of antenna relay unit BC-442-A. Lead A was left out in units where S 54 was used.

Interior view of the completed rf accessory unit. Note use of the octal socket terminals as power supply component tie points and the short, direct rf leads. RF shunt, described in the text, was not installed at the time of the photograph.

porate the relay along with the rf ammeter circuitry into a station accessory unit.

At this point, the conversion began to take shape. The power requirement for the relay caused a bit of head scratching, however a rather unique and perfectly acceptable solution was developed. As shown in the photographs, the relay is a dual coil unit with both windings brought out to terminals. By connecting the windings in parallel, instead of in series as in the original wiring, the power requirement becomes 12 volts dc. Most low power commercial transmitters have 6.3 volts ac available at an accessory socket. Since we must wire into the transmitter control circuitry to obtain push-to-talk operation, it is a simple matter to utilize this 6.3 volt source as the control voltage. Figure 2 shows how this is accomplished. A simple voltage doubler rectifier circuit is installed in the accessory unit and this voltage used to power the antenna change-over relay. This same supply may be used to power an auxiliary 12 volt dc relay if this is required in the station control system. Figure 2 shows the connections required for a typical push-to-talk installation.



4 12 VDC TO OPTIONAL AUXILIARY RELAY.
5 6.3 VAC FROM TRANSMITTER ACCESSORY SOCKET.
3 TO TRANSMITTER AND STATION GROUND.
6 TO PUSH-TO-TALK SWITCH AND OPTIONAL AUXILIARY RELAY WITH GROUND RETURN.

NOTE: SEE TEXT FOR THERMOCOUPLE SHUNT INFORMATION.

FIGURE 2

C1-C2	500 mfd, 25 WVDC electrolytic
CR1-CR2	1 A, 50 V PIV silicon diode
J1-J2-J3	SO-239 coaxial receptacle
J4	octal socket
K55	original relay, wired as shown
M50	original meter
TC50	original thermocouple

As shown in the photographs, construction of the antenna change-over unit is straightforward. The components are mounted in a Bud AC-1612-A sloping panel aluminum utility box which measures 4" x 6" x 4¾". The antenna, transmitter and receiver SO-239 coaxial connectors and the thermocouple are mounted in a row across the top of the back cover. The antenna relay is mounted below the connectors and positioned to insure the shortest leads. External connections are made to the octal socket, J4. This connector is also used as a tie point to mount the various relay power supply components. Mounted on the front panel of the box are the meter and a surplus chart frame which is used to secure the meter calibration chart. The photographs show the construction details. Wiring to the thermocouple should be as short and direct as possible and the layout shown provides for this. Use solder lugs to make the connections to the thermocouple.

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Use stranded, twisted pair to make the connection between the thermocouple and the meter. Figure 2 shows the proper connections to the relay. Do not reverse these connections or the relay will not operate.

The rf side of the thermocouple may be shunted as shown in Figure 2 to increase the range of the rf ammeter. In the prototype, the range of the meter was exactly doubled by installing a shunt made of a direct strap of #16 copper wire connected directly between the thermocouple terminals. When installing such a shunt, keep the shunt as short and direct as possible. Regulate the range by the size of the conductor, not the length. Use soldering lugs to insure good contact to the thermocouple terminals. Calibrate the shunted thermocouple-meter combination by connecting the instrument in series with another rf ammeter of verified calibration and connecting rf power. While the shunted thermocouple is frequency dependent, the error is not as serious as you might expect. The prototype meter, with the #16 wire shunt across the thermocouple, was connected in a test circuit in series with a standard rf ammeter and readings taken at various frequencies. In each case, output was adjusted to obtain a reading of 0.8 (1 ampere rf) on the shunted meter and the actual current read from the standard meter. Results were as follows:

BAND	RF CURRENT
10 M	0.9
15 M	1.0
20 M	1.0
40 M	1.0
80 M	1.2

Components of the Command Set Antenna Relay Units make a very satisfactory rf accessory unit for amateur use. Use of a single-package rf metering and antenna change-over unit is highly recommended as a simple means of clearing up some of the haywire around the shack and as an extremely useful station accessory. . . . W4WKM

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UNIFORM BUILDING CODE WIND PRESSURE	ANTENNA projected area
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30 lbs./sq. feet	5 sq. feet
L.A. City Code (Strong Winds and Earthquakes)	10 sq. feet

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Book Reviews

K1APA

Are you looking for a very complete text on test equipment? ELECTRONIC TEST INSTRUMENT HANDBOOK (Howard Sams ETI-1) examines the theory and practical use of about every conceivable testing device that the technician, engineer or radio amateur will use. Of special interest are chapters on audio test equipment, frequency and modulation measurements, capacitance, inductance and impedance tests. Soft-cover, 288 pages, $4.95

Leonard Lane has just written a two volume set (Rider #310) entitled ELEMENTARY INDUSTRIAL ELECTRONICS. These books are aimed at the service technician or technical school student who needs a working knowledge of how electronic equipment is used in modern industry. Sofe-cover, 2 vol. set, 325 pages, $7.80

HOW TO SOLVE PROBLEMS IN ELECTRICITY AND MAGNETISM by Henry Jacobowitz, samples and solves typical problems a student of the subject would encounter. This text (Rider #302) is an ideal addition to the library of the ham, technician or engineering student who wants to develop his ability to handle problems. Included are chapters on ac and dc circuits, electromagnetism, transistors, modulation, transmission lines, waveguides, cavity resonators and antennas. Soft-cover, 185 pages, $3.50

The Radio Society of Great Britain recently published a RADIO DATA REFERENCE BOOK. This text, compiled by G. R. Jessop G6JP, presents commonly used material in the form of curves, tables and charts. A wealth of information for the amateur! Hard-cover, 136 pages, price 12/6. Available from R.S.G.B., Russell Street, London, England.

RADIO TV-ELECTRONICS DICTIONARY (Rider #307) contains in 190 pages just about every term that one could encounter in the field of electronics. In addition to the clear and concise definitions this text contains a section on abbreviations and symbols. Soft-cover, $3.50

SINGLE-SIDEBAND COMMUNICATIONS HANDBOOK, a Howard Sams text by Harry Hooton, is an excellent book for anyone who wants to have a good grasp of SSB. It contains in one up-to-date volume material on the design, construction and operation of modern SSB equipment. In addition, this text examines some of the currently available commercial SSB gear. Hard-cover, 286 pages, $6.95

Howard Sams has just released a book, written by Edward Noll, entitled MODERN COM-

MUNICATIONS SYSTEMS (MCN-1). This volume is the first in a series and contains theory as well as practical experimental projects. Included are chapters on oscillators, amplifiers, multipliers, antennas, transmission lines and other phases of communications systems. Soft-cover, 258 pages, $4.95

TROUBLESHOOTING AMATEUR RADIO EQUIPMENT (Howard Sams AMP-1) is another fine book by Howard Pyle. This is just the thing to have for field day or contests when some piece of gear quits. In addition to examining receiver, transmitter and antenna troubles it has a chapter on preventive maintenance. Soft-cover, 128 pages, $2.50

Want to be thoroughly versed in rf interference and its prevention? Read RF INTERFERENCE AND CONTROL HANDBOOK (Howard Sams RIC-1) by Barron Kemp. This text is a thorough study of the theory, measurement and methods of suppressing rf interference. Chapters include suppression in rotating machinery, ignition systems, teletype equipment and other equipment. Hard-cover, 224 pages, $6.95

AMATEUR RADIO ANTENNA HANDBOOK (Howard Sams AMA-1) by Harry Hooton is a comprehensive coverage of the theory and construction of amateur antennas and towers. It includes information on all of the types of antennas that the average amateur might consider erecting, plus chapters on propagation, transmission lines, impedance matching and antenna coupling systems. Soft-cover, 160 pages, $2.95

Letter

Wayne O.B. (Should be S.O.B.)

I have a photostat copy of your recent letter to a mutual friend inquiring as to my assistance in a specific program. This particular letter also outlined your desire to inform the individual all about my personal life since you were fully aware of my activities. Bully for you.

Your letter also revealed that I had stated to your attorney that you were a "gutter snipe" and that I threatened to assist in the cutting down of advertising in your imitation of a magazine. I do want to confirm that I did state you were a gutter snipe and in fact my limited vocabulary does not include any better description of one Wayne Green. I do not have to hear about you and your comments and nor do I have to read your writings. In fact, I can smell you all the way down in New York.

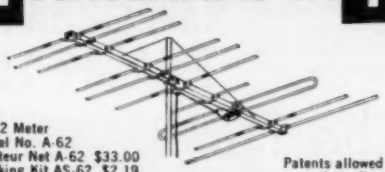
As to a cut down of advertising, need I say more? You already have felt the effects and I contemplate being fully successful in some day picking up your ridiculous publication only of course to find empty pages.

I guess that each fraternity has its' clown as in ham radio, you take the crown for being the clown. Perhaps someday you will grow up.

I hear rumors that you will finally become a WA1 or WB1. I presume the Call Letters could very well be WB1CHC. It could not happen to a nicer guy, I hope.

From your friend, of course,
you moronic slob,
Maxwell Meyers W2BIB

2 ANTENNAS IN 1



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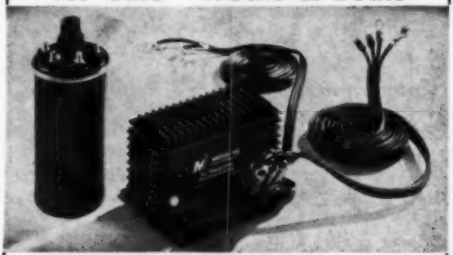

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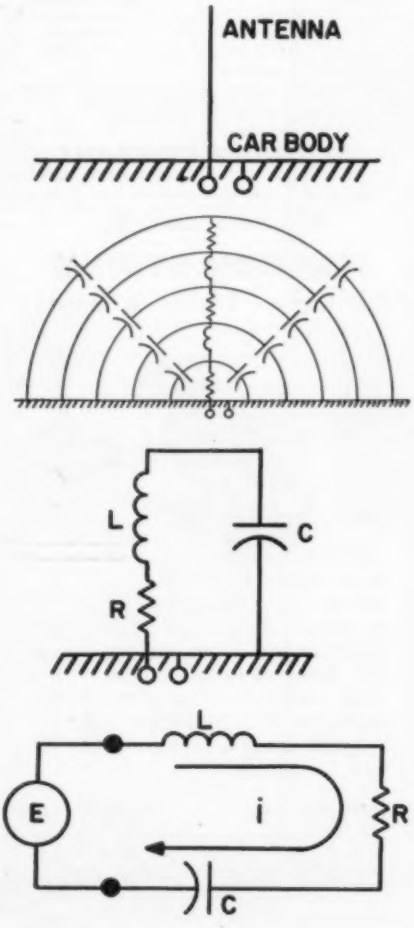

With the increasing number of mobile stations, the use of inductively loaded antennas is becoming more and more common. The large variety of commercial loading coils on the market makes it easy to put a mobile station on the air and even home-built coils can be adjusted and used without knowledge of how they operate in the antenna circuit. It is the purpose of this article to point out what role the coil plays.

The principles set forth in this article are applicable to any inductively loaded antenna system, although the emphasis here is on the mobile station. For the purpose of this article, the effects of the ground on which the automobile is standing or moving are neglected, even though they may become appreciable at the lower frequencies.

Consider the antenna shown in Fig. 1.

Radio frequency current applied at the terminals encounters resistance and inductance in the antenna (as any alternating current does in a wire). It also flows through the capacity between the antenna and the car body. Therefore, to the current flowing into the input terminals, the antenna appears as shown in Fig. 2, where there are an infinite number of resistors, capacitors, and inductors distributed along the antenna.

To aid in the analysis of Fig. 2, the circuit may be approximated by lumping the resistances, capacitances, and inductances into three units, as shown in Fig. 3. This is recognizable as a series circuit, and it is important to realize that, when properly adjusted, the operation of the antenna is similar to that of a series resonant circuit. For this reason, it is necessary to understand some of the principles of this type of circuit.

In Fig. 4, assume that R is the load to which it is desired to supply power from the constant ac voltage source e. From the relationship $P = i^2R$ it is seen that, for a fixed value of R, the larger i becomes the more power is supplied to R. The value of i is given by $i = \frac{e}{R + j(X_L - X_C)}$ where X_L is the reactance of the coil and X_C is the reactance of the capacitor. Since R and e were stated to be fixed values, i can be increased only by making the value of $(X_L - X_C)$ approach zero. $X_L = 2\pi fL$, where f is the frequency of the applied a.c. voltage and L is the inductance of the coil. $X_C = \frac{1}{2\pi fC}$ where f, again, is the frequency and C is the capacity of the capacitor. An examination of the formula for i shows that when $X_L = X_C$, the value $(X_L - X_C) = 0$, and i is at its maximum. The greater the difference between X_L and X_C, the smaller i becomes.

Now, let us return to the mobile antenna in Fig. 1. The inductace of the antenna rod is L in Fig. 3 and 4. The capacity to the car body is C, and R is the combined radiation resistance and loss resistances in the antenna rod and the car body.*

Suppose first that it is desired to operate the antenna at a frequency of 29 mc. From the discussion of series resonant circuits, we know that the current in the antenna should be as great as possible. Also, from a mechanical standpoint, we prefer to have the antenna as short as possible. With these two things in mind, suppose we try an antenna length of one foot. This is good mechanically, but we would find that the current in the antenna would be very small. The reason would be apparent if we could measure the inductive and capacitive reactances of the antenna. The inductive reactance would be small, and the capacitive reactance would be large. This is because the antenna is too short for the frequency involved.

It was pointed out in the discussion of series resonant circuits that for maximum current, the reactances must be equal. Therefore it becomes necessary to increase the inductive reactance or decrease the capacitive reactance, or both. It is quite easy to do both, simply by increasing the length of the antenna. The inductive reactance increases because of the increase in inductance. This is apparent from the formula $X_L = 2\pi fL$. This is similar to increasing the number of turns on a coil. Also,

* For good efficiency it is important that the radiation resistance be large as compared to the loss resistances. For a discussion of this point see the references given at the end of this article.

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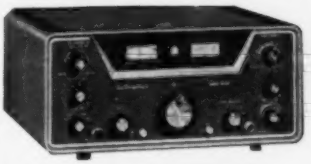

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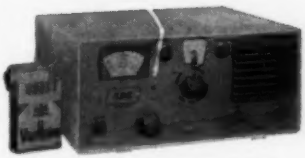

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the increase in length increases the capacity between the antenna and the car body, and from the formula $X_C = \frac{1}{2\pi fC}$ we see that the result would be a decrease in X_C. This is similar to meshing the plates of a variable capacitor.

If we continued to lengthen the antenna we would find that at a length of about eight feet the reactances would be equal and the antenna current would be maximum. At this point we say the antenna is resonant.

In the foregoing example of an eight foot antenna for 29 mc, the length is quite feasible mechanically, and resonance was obtained without the use of a loading coil. However, let us now see what happens when we try to operate at a lower frequency, say 3.9 mc. If the eight foot antenna, resonant at 29 mc, were operated at 3.9 mc, much the same condition would exist as when we tried a one foot antenna at 29 mc; that is, the antenna current would be low, because the capacitive reactance would be high as compared to the inductive reactance. Therefore, we must again increase the length of the antenna if we wish it to be resonant at 3.9 mc. As the length is increased from eight feet, the inductive reactance increases and the capacitive reactance decreases, until at a length of about sixty-four feet they are equal, and the antenna current is again maximum. The antenna is now resonant, but an antenna sixty-four feet high mounted on an automobile is quite impractical mechanically, to say the least. The problem, therefore, is to make the eight foot antenna resonant at 3.9 mc without increasing its length.

In order to find a way to do this, let us first remember that by lengthening the antenna from eight to sixty-four feet we were trying to make the reactances equal. Now the capacitive reactance of the eight foot antenna cannot be decreased without increasing its length or in some other way increasing the capacity between the antenna and the car body. However, the inductive reactance can be increased so that it is equal to the existing capacitive reactance. This is done by inserting a coil in series with the antenna rod and adjusting its inductance so that the antenna is resonant. As stated earlier, resonance occurs when the reactances are equal, and this point can be indicated by a minimum reading of a Standing Wave Ratio Bridge connected at the input terminals of the antenna.

This is the "loading coil" which is so familiar in mobile installations. It is called a loading coil because it "loads" the antenna circuit with inductive reactance. This is necessary to balance out the capacitive reactance produced as a result of the antenna being shorter than the length required for resonance at the frequency of operation.

This is not the end of the mobile antenna story. We have only seen why a loading coil is used. There are many considerations necessary in the installation of an efficient mobile antenna system, such as the placement of the coil (bottom, center, top, or continuous loading), size of wire on the coil, and matching the antenna feedpoint impedance to that of the transmission line. It is not the purpose of this article to cover these items because they are discussed in detail in the ARRL *Mobile Manual* and *Antenna Book*. These publications are recommended to the reader who is interested in further information.

. . . W9GCQ

John Nelson

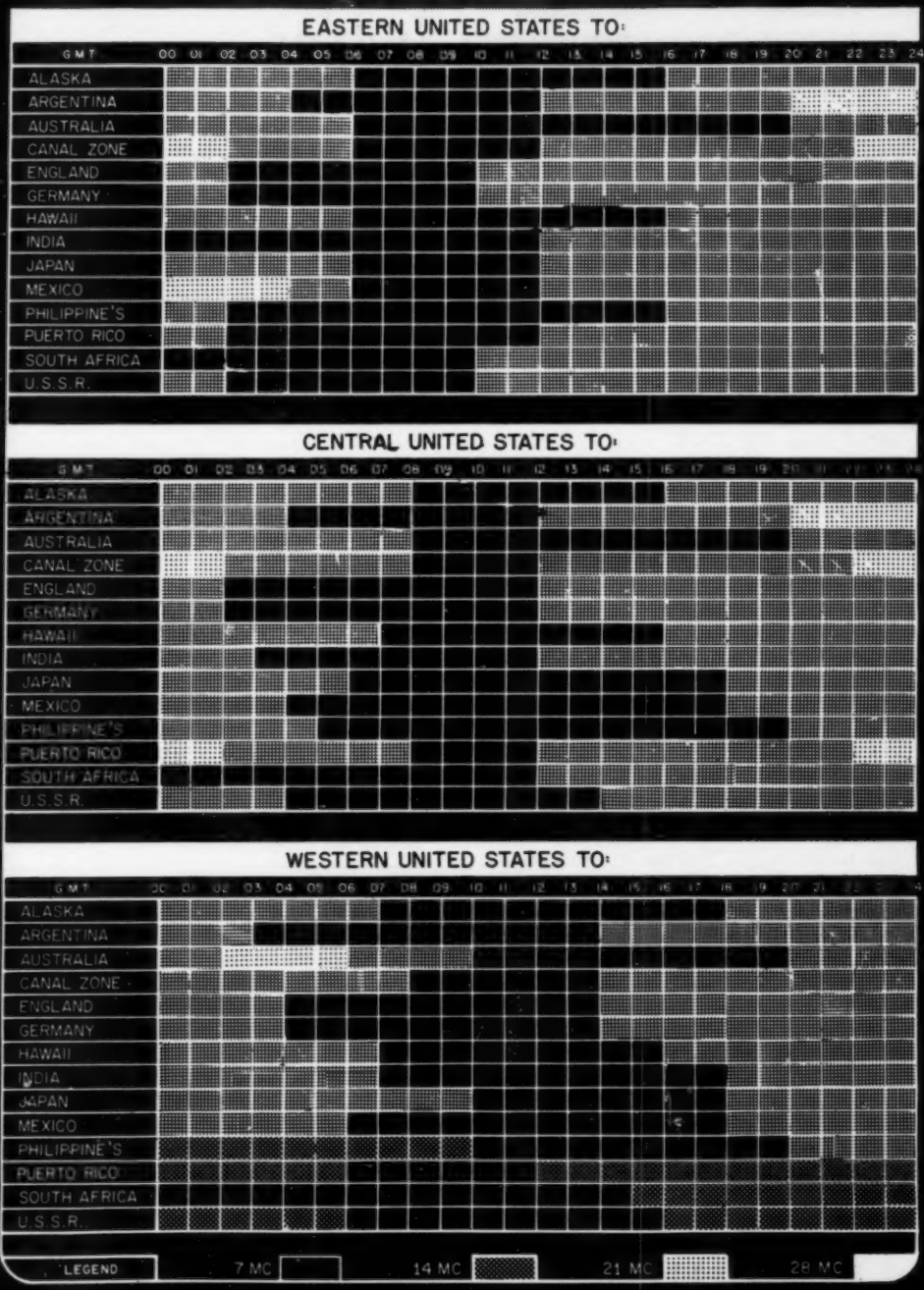
Propagation Charts

VHF Note:

Sporadic E is predicted for June 10-11-12, 15-16, and 18-19.
The 12th will probably be the strongest.

PROPAGATION FORECAST
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
GOOD
FAIR
BAD
Es
= INDICATES PREVALENT CONDITIONS

PROPAGATION CHART



More Selectivity for the Two'er

Dauph K6JCN

It is a well known fact that a superrengen receiver is sensitive. However, it is also extremely broad. Four or five signals will cover the entire two meter band.

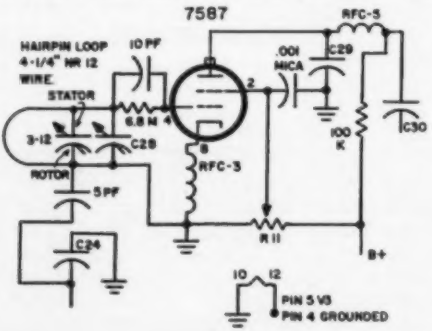
A receiver of this type can be made selective. In fact, the selectivity can be made almost equal to that of a superhet and with far less tubes.

Approximately thirteen years ago, experiments were made with a coaxial tank input circuit having a bandwidth sharp enough to receive two signals only 30 kc apart in the two meter band. The 6AK5 was the only tube found to work in this circuit.

An adaptation of this circuit was tried on the Heath Kit Two'er, just recently, and with excellent results. Two strong signals, less than 100 kc apart were copied without interference. Ever since the introduction of the Nuvistor Tetrode, I have been anxious to try it in this circuit. This tube has twice the gain-bandwidth of a 6AK5.

In order to modify the Two'er, remove L6 and enlarge the hole to accommodate the Nuvistor socket. Then, drill a small hole between RFC-5 and this hole. A plate lead should be brought through to the RFC-5. Next, change the 68K resistor (R12) to 100K and connect to the B plus side of the regen control. Next, bring a lead from the tie point that held the 68K resistor to pin 2 of the Nuvistor socket.

A .001 mfd mica capacitor is also connected to pin 2 and the other side grounded. The RFC-3 is removed from pins 3 and 4 of V3B and connected to pin 8 of the Nuvistor socket. Pins 3 and 4 of V3B are now grounded.



Next, a lead from pin 5 of V3B is connected to pin 10 of the Nuvistor socket. Pin 12 is grounded. Remove R10 and C26. Remove lead from pin 1 of V3B. Pins 1 and 2 of V3B now have no connections.

A piece of #12 bus wire 4¼" long is formed into a hairpin loop and soldered to the stator prong furthest from the chassis. The other end is soldered to the rotor connector. A 5 mmfd capacitor is connected from pin 6 of V3A to the loop about 1" up from the rotor. If it is too far up, it will stop oscillation. Just short of this point is best.

The grid capacitor is connected from pin 4 of the Nuvistor socket to the loop. Depending on the amount of selectivity desired, the grid resistor will vary from 2.2 Meg to 7.4 Meg. The lower the value, the broader the bandwidth.

While 7.4 meg. gives the sharpest bandwidth, it also reduces the audio. This is characteristic of superregens. A good compromise would be 4.7 Meg.

The selectivity was increased by a factor of 5 and almost equals the selectivity of the Gonset #2. The sensitivity was measured at ⅛ micro volts. . . . K6JCN

Parts Kit Available

Full info on 73 Parts Kits on page 123. This unit catalogs at $6.89. Order K6JCN Kit for only $6.50.

Letters

Dear Wayne:

Although I am not in the habit of writing letters to an editor, I just couldn't resist this one after reading your editorial in the April Fool issue. The description of your subscription trials and tribulations was too close to home. We've gone through exactly the same miserable situation ourselves and know only too well what it is like to be on the receiving end of an irate subscriber's invective.

What really hurts, of course, is that by his lights he is

perfectly justified in complaining, for, regardless of whatever else, he has paid his money and he hasn't received his magazines. It is neither an excuse nor a justification to say the mess is the fault of the outside service house — even though it's true. And that's exactly why the situation is so infernally frustrating to everybody.

Before ending this letter, I would like to say that I enjoy 73 because it is a maverick, just like you are, and being your personal creation it is a reflection of your personality by extension. Perhaps I feel this way because of a tinge of envy. The magazine I edit is much more formal and restricted. Its audience, I'm afraid, would never see the humor in such things as the last line in your indicia.

Morton Waters W2JDL

CW Abbreviations

I goofed! Or more about the Phillips code, and stuff. The magazine **Telegraph and Telephone Age**, the former publishers of the Phillips code book, has gone out of business. The code book is, however, available from Radio Bookshop, Peterborough, N. H. The price direct from them is $2.75 postpaid.

It is gratifying to note the interest in the Phillips code. It can be very useful. For example, how do you indicate a dollar sign in cw? Phillips code provides the answer "sx." "Lx" is pounds Sterling, and a simple hyphen is "hx" "gx" is "great excitement," like when zj8zz calls cq on 20 meters on a Sunday afternoon. Think of the effort saved when you just say "utc" for "under the circumstances," "itc" for "in this connection," or "ixu" for "it is understood." "qpt" is code for "on the part of the." You needn't know how to spell "conscientiously." Just use the Phillips code "kny" and let the receiving operator figure out how to spell it!

The Phillips code provides a uniformity not now evident in the jumble of abbreviations used on cw. With Phillips it is possible, "ixp", to get a 33 1/3% increase in cw speed. That means we could get 1/3 more cw boys on the air without increasing the qrm! No? A worthwhile accomplishment.

Perhaps Wayne Green will offer a "ccc" certificate for a "code chewers club" award. It could start with all former press operators as charter members with the usual buck for handling and administration thereof.

Harold Carlson K7MSL

Dear Wayne:

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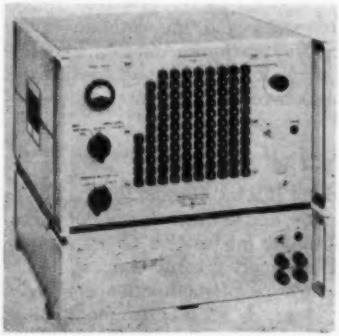

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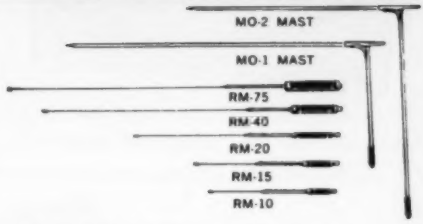

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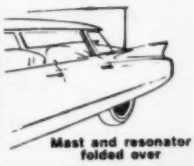

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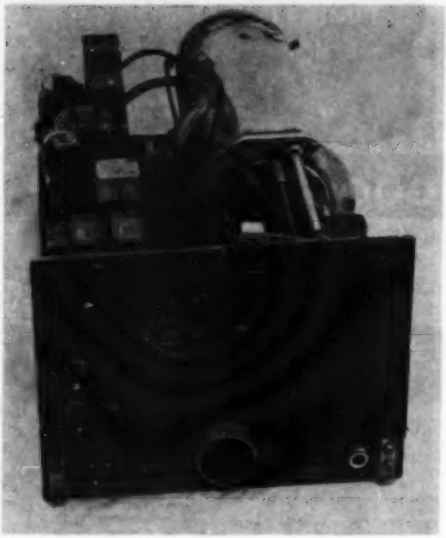


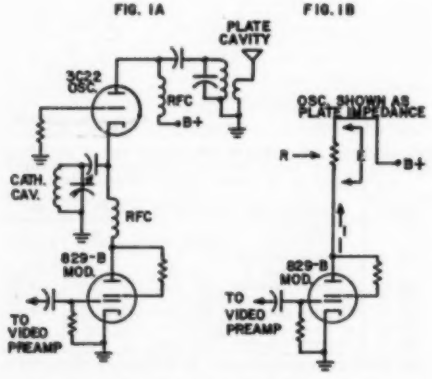
Photos by Joe DeYoung WA6CQL

Amateur Television with the ART-26

ART-26 Front view before the addition of 11 pin octal power plug.

Jim Kennedy K6MIO
Chuck Colby WA6BSL

The ART-26 is, in the rough, a small military video transmitter. The rf portion of this transmitter uses a 3C22 lighthouse triode as a self-excited oscillator-final in a coaxial cavity circuit. This cavity is a ruggedly constructed assembly which contains tunable coaxial lines which tune the plate and cathode circuits separately. These are connected to a gear drive and counter system that makes it possible to tune the plate and cathode line together or the cathode line alone by merely pulling out on the tuning knob. Two counters on the plate and cathode gear drives have over 2000 digits over the tuning range of 300-600 mc. This represents an average of 6.7 digits per megacycle. There is also a tuning knob lock.



a) Simplified circuit of the ART-26 series type plate video modulator
b) Series plate video modulator with modulated stage shown as resistor equal to plate impedance of that stage.

Electrically the oscillator cavity assembly represents two concertrically arranged one quarter wave length coaxial lines. In this type of oscillator the plate cavity primarily determines the frequency and the cathode cavity is then tuned for maximum output. The stability of this oscillator is very good considering the band widths involved. The resetability precision is also very good.

The Modulator

The modulator is a bit unusual for the power of the transmitter and is deserving of comment. When attempting to modulate a TV transmitter whose input is much greater than the dual 6AF4 class, the type of modulation employed is, generally, some type of grid modulation.

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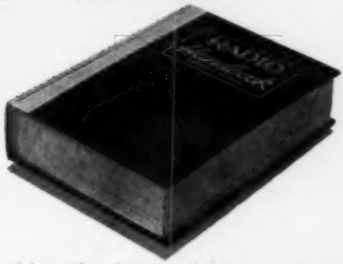

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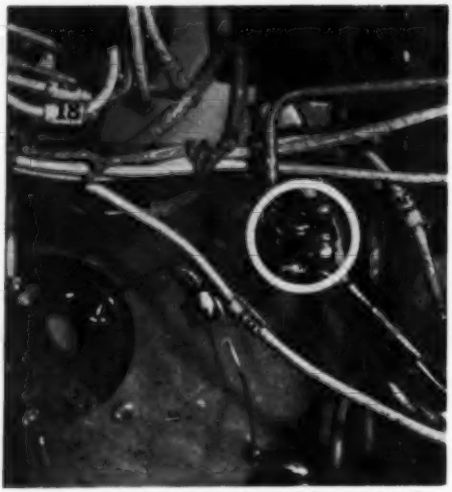

L shaped metal tube in upper left quarter of photo contains oscillator grid lead, circled is the added by-pass capacitor.

This system has the advantage of requiring relatively small tubes to modulate rather high powered stages. There is, however, one serious disadvantage and that is the low transmitter efficiency inherently brought on by grid modulation.

The ART-26, however, does not employ grid modulation. It employs a series type plate modulator which operates very effectively and enables the transmitter to operate at full efficiency; at least twice that of the same transmitter employing grid modulation.

Fig. 1a shows a simplified diagram of this type of modulator. The oscillator circuit is shown in its lumped constant equivalent. As can be seen in the diagram the oscillator final is actually in series with the modulator tube. Any current that the final draws must flow through the modulator tube and conversely any current drawn by the modulator tube must flow through the final. Now, if a video voltage is applied to the grid of the modulator, it will not only control the modulator current but it will necessarily also control the final current as they are one and the same.

It will be noted in Fig. 1b that the voltage E across the plate impedance R of the modulated stage varies in direct proportion to the modulator plate current I; or E=IR. It will also be noted that the modulator plate current I is directly proportional to the video voltage at the grid of the modulator. Therefore, as E and I are directly proportional to each other and to the video driving voltage, the power consumed by the resistor R is equal to ($E \times I$) and is directly proportional to the square of the video driving voltage. This is the necessary condition for linear amplitude modulation and, as has been proven, this condition is met. Of course, in practice not all the power is turned into heat as it would be in a resistor. Happily some of this power is delivered to the antenna and makes this whole project worth while.

It should be noted that when this type of modulation is used the average plate to cathode voltage of the final is about one half of the applied B+. It is this voltage that is used when computing the input power of the transmitter. When an 800 v B+ is used it will be found that a dc voltmeter connected between the plate of the 3C22 and the plate of the 829-B modulator (same as 3C22 cathode, see Fig. 1a) will read about 500 volts. This voltage times plate current represents the average input of the transmitter.

The Conversion

The conversion is simple. The original power supply was designed for 800 cps operation, so it is useless to the amateur. The transmitter requires 800 vdc at 100 ma, 400 vdc 100 ma, 24 vdc at 1.5 amps and 120 vac. A power supply must be constructed to meet these require-

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9053	14.0 - 28.0 uh	65	10 Mc.	7 Mc.	5 Mc.	3.5 Mc.	2.5 Mc.		
9054	28.0 - 60.0 uh	60	7 Mc.	5 Mc.	3.5 Mc.	2.5 Mc.	1.9 Mc.	1.0 Mc.	
9055	60.0 -120.0 uh	70	5 Mc.	3.5 Mc.	2.5 Mc.	1.9 Mc.	1.0 Mc.		455 kc.
9056	120.0 -280.0 uh	70	3.5 Mc.	2.5 Mc.	1.9 Mc.	1.0 Mc.		455 kc.	
9057	280.0 -650.0 uh	70	2.5 Mc.	1.9 Mc.	1.0 Mc.		455 kc.		260 kc.
9058	.65- 1.3 Mh	60	1.9 Mc.					260 kc.	
9059	1.30- 3.0 Mh	55					260 kc.		100 kc.
9060	3.00- 10.0 Mh	40	capacitance value to resonate at frequency			260 kc.		100 kc.	
9061	8.00- 20.0 Mh	40					100 kc.		50 kc.
9062	15.0 - 40.0 Mh	40				100 kc.		50 kc.	
9063	20.0 - 60.0 Mh	45					50 kc.		

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ments. The only modifications which must be made to the transmitter are the following:

There is a 800 cps filament transformer located in front of the cavity assembly on that subchassis. This transformer supplied 5 vac at 2 amps for the 5V4, 6 vac at 2 amps, for the 3C22 and 6 vac at 8 amps for the modulator assembly. This transformer must, of course, be removed for 60 cps operation. In the space occupied by this transformer, filament transformers supplying 6 vac at 2 amps and 6 vac at 4 amps should be placed. The space available will easily accommodate two transformers.

To remove the transformer, turn the transmitter over and you will find a removable bottom cover on the rf subassembly. Twist the two screws and lift off the plate. You should find that the leads connected to the transformer pins are numbered, as are most of the other cables. The same numbering system seems to have been used in most units, so the numbers given here will probably apply, but look the situation over first to be sure. Unsolder the leads and remove the old transformer.

Mount the two new transformers in place of the old one and connect the 120 vac primarys of each to leads Nos. 18, 19 and 21, 4. 18 and 19 should be connected together and 21 and 4 should likewise be connected together. Each of these junctions represents one leg of the 120 vac.

Connect one leg of the 6 vac at 4 amps to the chassis and the other leg to leads Nos. 20 and 26.

The 6 vac at 2 amps is connected to leads Nos. 13 and 15. These supply the 3C22. It is absolutely essential that the 6 vac supply for the 3C22 not be grounded and must be completely independent, that is, there must be no other tubes on the 6 volt side of the circuit. No attempt should be made to supply the 3C22 from any source common to other tubes because the cathode of the 3C22 is about 600 vdc hot to ground and such a connection would either destroy the 3C22 or the other tubes on the 6 volt circuit. This 6 volt transformer should have at least 800 vdc insulation.

You will find that all the old transformer leads are now accounted for except two short, heavily insulated leads which go directly to the 5V4 socket nearby. This tube has been eliminated for reasons explained later. Remove the lead that goes to pin 8. Bend the lead that goes to pin 2 back and connect it to pin 6. Be sure that pin 2 is the pin that also has a lead going to the coil on the top of the chassis next to the tube socket. If it is not, then pin 8 is, and pin 8 should be connected to pin 6 instead.

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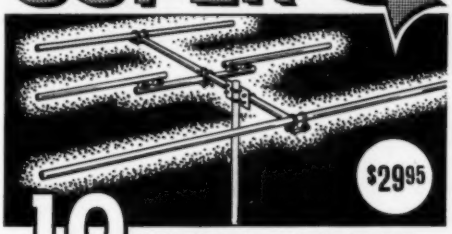

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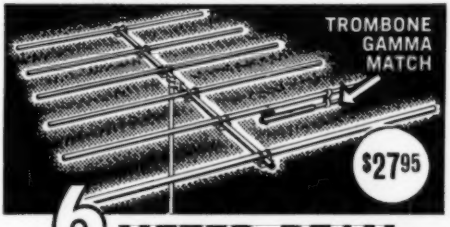

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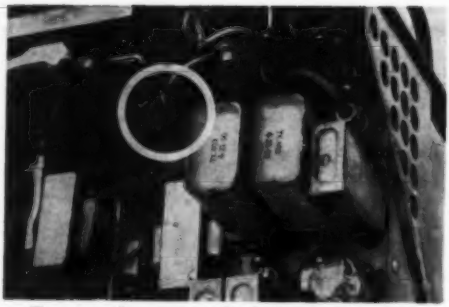


Two transformers on the bottom are in parallel to supply 6 vac @ 4 amps, "piggy back" transformer supplies filament power for 3C22. Circled is the meter series resistor and the resistor added to correct its value for the new meter.

There is a time delay relay (6-NO 110) socket located near the filament transformer. This relay was an "idiot proofing" device which operated a 24 vdc relay located under the bottom cover of the oscillator assembly and made it impossible to apply voltage to the plate of the 3C22 for 110 seconds after the filaments had been turned on. You may keep this feature if you wish, but, if for no other reason but the cost of the relay, I suggest that the system be eliminated. Most of us are accustomed to letting the filaments warm up before trying to turn on the carrier.

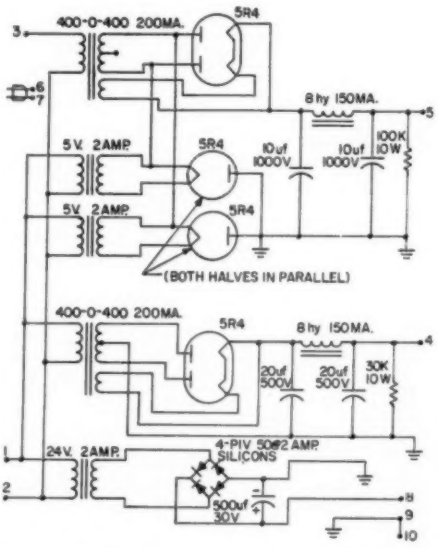
Toward the rear of the underside of the unit you will find the 24 vdc relay mentioned. Remove lead No. 4 from the switching contact and solder it to lead No. 3 on the normally open contact. In the middle of the bottom near this relay you will find a small terminal board. On one of the terminals you will find a lead No. 5; remove it and tape it up. You have now eliminated and disabled the relay.

The large ten pin plug on the front panel is difficult to replace cheaply and it is therefore advisable to eliminate it this way. Remove the modulator subchassis (screws on the bottom). This allows easy access to the four pin plug marked POWER. The leads should be unsoldered from the POWER plug and the plug removed. In its place an eleven pin octal male plug should be placed. This will now become the plug to supply all the voltages. The leads on the large ten pin plug on the front panel should be carefully removed one by one and new wires about six inches long spliced to those that will be used. You will find that it is not necessary to remove all these leads as some are not used. These wires are run along the cable harness to the newly installed power plug. Leads Nos. 12, 18, 9, 10 and 7 should be spliced (these wires were removed from pins Nos. A, G, J, H, and M, respectively). Lead No. 7 carries the 800 vdc and should be insulated accordingly. These leads are connected to pins 1, 2, 3, 4, and 5 respectively on the new plug. Leads No. 17 and 19 (removed from the old POWER plug) are connected to pins Nos. 6 and 7. Lead No. 23 (old POWER plug) is connected to pin No. 8 and the ground lead (old POWER plug) is connected to pins 9 and 10.

We have also found that some additional by-passing of the oscillator grid will increase the output of the transmitter. This may not apply to all units but it will probably make a substantial difference in most. In one unit tested, it increased the output power by about four times.

In the underside of the rf section there is a one terminal tie point which was held in place by one of the mounting bolts on the old filament transformer. There is a lead attached to this tie point which runs through a small metal tube which acts as shielding. This tube runs through the chassis to the cavity and is the grid lead of the 3C22. At the tie point I mentioned add a 25 mmfd capacitor from the metal tube to the tie point. This should supply all the bypassing needed. Much higher values will seriously effect the video.

FIG. 2



Suggested power supply. Numbers on leads refer to pins on the power plug. Tube location chart (top view).

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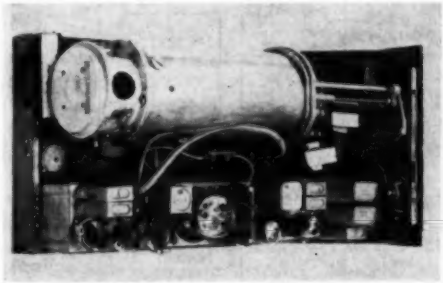
This completes the transmitter modification.

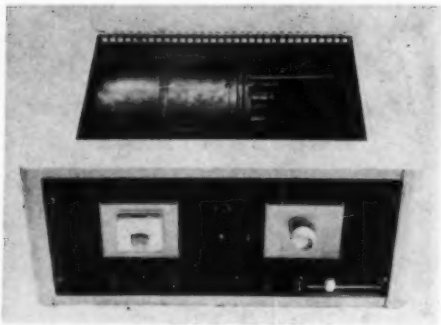
The transmitter has a separate sync modulator. This apparently was designed to accept the separate sync pulse provided by such cameras as the ATJ-ATK. However, it has been our experience with the several units we have tested that the sync output of this special modulator is actually inferior to the pulse obtained by merely coupling a little of the camera's sync into the video through a small capacitor in the camera. The resulting composite signal (video, blanking and sync) is fed into the plug on the front panel marked, VIDEO & SYNC. The SYNC only plug is not used. The tubes in the sync modulator are merely left out. This reduces the filament drain, as well as pocket book drain. The sync tubes, two 6AR6's and a 6SN7 are shown in Fig. 3 merely for sake of completeness. The 5V4 is also a part of this system and is likewise not used and may be left out.

The Power Supply

Now it is necessary to construct a power supply to provide the 800 vdc at 100 ma, 400 vdc at 100 ma and 24 vdc at 1.5 amps. Fig. 2 shows a typical supply. T1 and T2 are TV set power transformers. These may often be obtained very cheaply from junked sets in junk yards and dumps. We have got them for as little as 50c. These transformers generally have ratings in the neighborhood of 400-0-400 at 200 ma and will easily handle the job. T1 is used in a standard bridge circuit to obtain 800 vdc. This plate supply is turned on by applying ac to the primary. This is done by the HI VOLTAGE ON switch in the transmitter. In the circuit shown the filaments of one of the rectifiers come on simultaneously with the high voltage. This will not hurt anything, but if you are feeling rich you can pick up another



ART 26 Top view, note empty tube sockets to rear of modulator chassis.



WA6BSL preferred to put the unit in a surplus cabinet and remote the switches to the front panel. Extra switches are for changing cameras.

filament transformer and all the filaments in the rectifiers will stay on.

The 400 vdc supply is a conventional full wave supply. The 24 vdc supply is for the blower.

It will be noticed that all the switching for power is handled remotely by the two switches on the transmitter.

All the units we have encountered have had the front panel meter pirated. This meter may be replaced by any 0-1 ma meter but it may be necessary to alter the series value to suit the particular meter you use. This resistor is located on the end of one of the meter leads and may be a wirewound or two compositions in parallel.

Tuning Up

Now that you have your power supply and transmitter ready, plug in the tubes. When inserting the 3C22 it will be noticed that the phenolic cover that bolts over the plate fins has a pointed screw and lock nut. Loosen the lock nut before you bolt this disc back in place.

When the tube is in place and the disc bolted down, look through the large air hole in the cavity. Tighten the screw until you can see that the plate seal of the tube is snuggly pressed against the plate contact ring. Don't force it. When it is snuggly pressed tighten the lock nut.

Next you need a pair of Lecher wires.[1] Plug a type N connector with a small loop on it into the ANTENNA plug. This is used to couple energy into the Lecher wires. Set the wires at 33.8 cm if you wish to be on 445 mc. Use the formula in ARRL Handbook to find the half wave length for other frequencies.

Set the Plate and Cathode counters at about 2420. Put the meter switch in the ANT. OUTPUT position or put a small loop on a 3 volt lamp and put it close to the antenna loop.

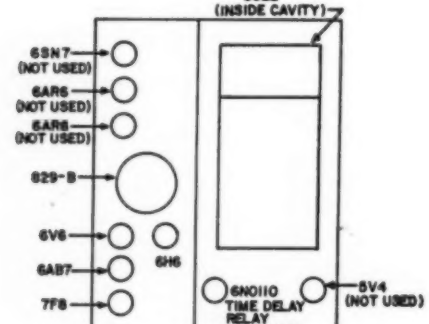
Picture as it appears at WA6BSL's QTH five miles away. Camera used is a sick ATJ. Picture is a modified travel poster.

Connect the power supply to the transmitter and turn on the POWER switch. Wait two minutes and turn on the HIGH VOLTAGE switch. The lamp should light up indicating output and the ANT. OUTPUT meter should give some indications. Now, couple in the Lecher wires to the antenna loop. Tune the Plate and Cathode simultaneously for maximum indication on the indicator on the Lecher wires. This should put you on frequency. Now, pull out on TUNING knob and tune the cathode alone for maximum output and tighten the tuning lock.

If you have a video monitor connect it to the MONITOR plug on the front panel. The video is obtained from a diode probe in the transmission line.

Now plug in your camera or scanner to the

FIG.3



1 See the Radio Amateur's Handbook.

(Turn to page 121)

Special

Surplus Catalog

As a youngster in New York, I spent a great deal of my Saturdays picking through the bargain counters of Cortlandt Street and Wholesale Radio up on Sixth Avenue, carefully apportioning my week's lunch money to net me the maximum number of parts.

The amazing bargains of the 30's were nothing compared to the bonanza that hit us after The War. The ham who liked to tinker could almost go out of his mind while going through the fantastic surplus houses that sprang up.

My barn here is not too mute testimony to the number of bargains that I have been exposed to. The collection is impressive and I regret not one 19c pot. My only sadness is that back in the first flush of surplus my almost non-existent budget while going to school made me miss a lot of beautiful gear. Sigh.

One thing got my goat though. Maybe you noticed that there was very little Navy surplus around? Well, I did! And I thought I knew why. Let me set the scene for you.

My habit of accumulating things to fit whatever storage facilities are at hand was not disturbed by the War. When I reported aboard the U.S.S. Drum in 1943 at Pearl Harbor I was assigned a small locker for clothes and personal use. It was about 18" x 12" x 12". A year and a half later I had taken over most of the storage space on the submarine and when I finally was transferred to a teaching job back at the Submarine School in New London they were incredulous as I shipped home fourteen seabags and twelve large spare parts boxes of stuff. To the best of my knowledge I was the only ET in the Navy who had a radar repeater mounted in his sack so he could keep track of what was going on while off duty. Built it myself.

While teaching radio at New London I was greatly distraught to find that they were busy destroying millions of dollars worth of radio equipment. The story I got from a Texas ham who was in charge of the operation was that with the end of the war they found themselves with a warehouse full of radio and test equipment which had been supplied to go aboard submarines that were under construction. The construction was stopped on the subs, leaving all that beautiful gear sitting there with no place to go. So they chopped it up and crushed it into scrap. Navy men repeated similar tales of destruction on many other Navy bases. There is something unforgettable about watching a few dozen Dumont scopes being unpacked brand new from the factory and being chopped to bits, followed by a truckload of National receivers. SOB.

Luckily the Army released most of their gear through the surplus channels . . . and is still doing it. Today you have to do a lot of travel if you want to pick over the surplus counters for they are spread all over the place . . . Boston, New York, Philadelphia, Chicago, Cleveland, and Southern California. Or else you can take your pencil in hand and pour over the following pages of Surplus Catalog. As far as I know, nothing like this has ever appeared in a magazine before. If you like the idea we can do this once a year.

. . . Wayne

ELECTRONIC SURPLUS BARGAINS
SAVE UP TO 90%

RCA 6032 IMAGE-CONVERTER TUBE

Combined with suitable optical systems, this 3-electrode tube permits viewing of scene with infrared radiation. Scene to be viewed is imaged by optical objective upon semi-transparent photocathode. Spectral resp., S-1; good response up to about 1200A. Max. ratings, absolute, grid ±2, 20,000VDC or peak AC. grid ±1,2700VDC. **$9.95 ppd.**

NT-6 WILLARD 6-VOLT STORAGE BATTERY

Rated 2.4 amp hr. Approx. dimensions: 3½" l. x 1⅞" w. x 2⅝" h. Weight: 1 lb. 3 oz. (plastic case) Dry-charged. **$2.50**

POTTER & BRUMFIELD RELAY

#6M5L8 SPDT 3,000 ohm coil. 11/16" dia. x 1 11/16" long. Approx. weight 1 oz. Hermetically sealed. Standard 7-pin miniature base. **$2.00**

MINOR SWITCH

10-position, 3-pole with stopper coil and reset coil 6-12 volts D.C. off-normal non-bridging wiper approx. dimensions: 4" long x 4½" high x 1⅝" wide, weight: 1 lb. **$9.95**

24 VOLT DC POWER SUPPLY

Input: 115/440 volts A. C. 60 cycle, single phase Output: 24 volts D C at 25 amps tapped primary and secondary to vary voltage unit contains 0-30 volt D C meter and 0-30 amp meter, circuit breaker, filtered, selenium type rectifier approx. dim: 16" wide, 18" long 9½" high approx. wt.: 70 lbs. **PRICE ..... $49.50 each**

OIL CAPACITORS

1 mfd. 25,000 V. DC Westinghouse Interteen Type FP Style 1313854. **$39.95 each**

10 or more, **$35.00 each.**

GENERAL ELECTRIC FULL WAVE BRIDGE GERMANIUM RECTIFIER

input 117 volt AC, output 115 volt DC at 10 amperes approximate dimensions: 4⅝" x 4¼" x 1⅞" long weight: 3½ lbs. **PRICE ..... $9.95 each**

TEST SCOPE—SYNCHROSCOPE—PULSE ANALYZER

ID-59/APA-11. Late production. Modular subassembly construction. Video amplifier is flat to 4 mc. SBP1 presentation. Test-scope sawtooth 25-20,000 cy. Has all normal test-scope controls. As synchroscope and pulse analyzer, accepts positive or negative pulses. Video delay circuit permits leading edge of pulse to be seen. Calibrated-dial horizontal shift measures pulse durations from 0.5 to 100 microseconds. Sine-wave-oscillator calibrator measures recurrence rates from 200 to 6000 pps accurate within 0.4%. Built-in power supply requires 115v, 400 cy, 196 watts. External 60 cy power supply may be made to furnish plus 350 and—1300 vdc and 6.3 vac. In excellent condition, with all 19 tubes, schematic with parts values, parts-location pictures, operating instructions, theory explanation, and maintenance charts. Shipping weight 60 lbs. Used, good. ..... Price each **$19.50**

RG 58A COAX CABLE

52 OHM, 100 ft. lengths **$3.95**

NICKEL CADMIUM BATTERY 1.2 VOLTS

Rechargeable thousands of times. Alkaline storage battery sintered-plate. Flat voltage curve during discharge. Will hold charge for long period of time. High discharge rate up to 50 amps. Spill-proof, may be used in any position. Approx. 6-ampere-hour capacity. Dimensions: 6" high; 2" wide; ⅛" thick. Approx. wt.: 6 oz. Uses potassium hydroxide (30% Electrolite). **$1.95**

SIGMA EXTRA-SENSITIVE PRECISION RELAY—SERIES 5F

Extremely precise, rugged DC general purpose sensitive relay. Balanced armature, single-pole, double-throw. Suitable for wide range of adjustments. Dimensions: 1⅝"x1 5/16"x 1 11/16" high. Weight: 4¼ oz.
5F-10,000S: 10,000 coil ohms. Operates 1.0 ma DC **$4.95**
5F-16,000-S: 16,000 coil ohms. Operates 0.5 ma DC **$5.95**

POWER TRANSFORMER

Output: 12, 24, 36 volts. Input: 100 volts, 60 cycles, single-phase. Will handle 2½ amps. Steel case is hermetically sealed. 3¼"x 2⅜"x4½". Wt.: 3¼ pounds. **$2.95**

DIRECT-READING MAGNETIC COMPASS

Full-floating card, compensating magnets, and dial light avail. in 6- or 12-v. bulb. Luminous dial. Mfgd. by Bendix-Pioneer. 3¼" x 3¼" x 2½". 1¾ lbs. **$8.50 postpaid.**

LORAN RECEIVER AND INDICATOR, MODEL DAS

110 volt, 60 cycle, single phase, 1700 to 2000 kc frequency range, 1 band, 4 channel, 5" screen, used in good condition. Price ..... **$49.50 each**

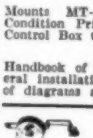
RADIO COMPASS RECEIVER

R5/ARN7 Frequency 100 to 1750 KC Price **$17.50**
R5A/ARN7 Price **$27.50**
Loop LP21 LM Price **$12.50**
Control Box C4/ARN7 Price ..... **$ 7.50**
Indicator 181A Price ..... **$ 4.95**

VARIAC TYPE V20

input 120 volt AC, 50/60 cycles output range 0-140 volts, 20 amperes PRICE ..... **$37.50 each**

TYPE AN/ARN-6 RADIO COMPASS



Receiver R/101/ARNN-6, 100-1750 kc. in 4 bands. Excellent condition. Price **$39.50**
Loop A8313-B. Excellent Condition Price **$27.50**
Indicator ID91B/ARN-6 Excellent Condition Price ..... **$ 9.95**
Mounts MT-273 or MT-274 Excellent Condition Price Ea. ..... **$ 9.95**
Control Box C-149A Price **$15.00**

MANUAL

Handbook of operating instructions, general installation adjustment plus 5 pages of diagrams and Schematics Price **$ 3.50**

ANTENNA WIRE

150 ft. stranded copper on windup reel complete PRICE ..... **$2.95 ea.**

12 FT. TELEPHONE STRETCH CORD

3 conductor wire with JK-53 and a U31/GT plug PRICE ..... **$1.49 ea.**

SILICON RECTIFIERS

All rectifiers listed at maximum peak inverse voltage ratings; approximate forward voltage drop. 1.5 volts.

1N1446	.075	amp.	100 volts	.50
1N1477	.075	amp.	200 volts	.60
1N1448	.075	amp.	300 volts	.75
1N1449	.075	amp.	400 volts	.85
1N1450	5	amp.	100 volts	1.00
1N1451	5	amp.	200 volts	1.25
1N1452	5	amp.	300 volts	1.50
1N1453	5	amp.	400 volts	2.00
1N1454	25	amp.	100 volts	3.00
1N1455	25	amp.	200 volts	3.50
1N1456	25	amp.	300 volts	4.50
1N1458	25	amp.	100 volts	3.50
1N1459	25	amp.	200 volts	4.00
1N05P7	50	amp.	50 volts	6.00
1N1462	50	amp.	100 volts	7.00
1N1466	75	amp.	100 volts	10.00
1N1467	75	amp.	200 volts	11.00
1N1468	75	amp.	300 volts	12.50
1N05V7	150	amp.	50 volts	16.50
1N1474	150	amp.	100 volts	17.00

X-BAND POWER LEVEL TEST SET, TS-36/AP

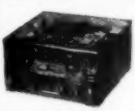
Brand new, in original packing, with accessories. Measures 10 to 30 dbm. 8700-9500 mc.

$14.95

TS-102/AP RANGE CALIBRATOR

This crystal controlled pulse generator produces a square-topped, 50-volt synchronizing pulse of .8 microseconds at a prf of 400, 800, 1600 or 2000 cps, and a triangular marker pulse of 0.4 microseconds duration at a prf corresponding to a pulse-echo distance of 1500 ft. The phase between the marker and sync. pulses is continuously variable from —180 to +180 degrees. **PRICE ..... $12.50 each**

BC1335 2-CHANNEL FM TRANSCEIVER



30-39 mc. This unit is complete with 18 tubes operating from either 6 or 16 volts D.C. (Self-contained power supply). Crystal control, sensitive superhet circuit. Approx. dimensions 11" x 10" x 6". Approx. 24 lbs. Unit complete with tubes, schematic diagram and presetting instructions. Like new . **$25.00**

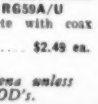
POWERSTAT TYPE 20

input 120 volt AC, 50/60 cycle output range 0-140 volts AC, 3 amperes PRICE **$9.95 each**

POWERSTAT TYPE 116

Input 120 volts, 50/60 cycle output range 0-140 volts AC, 7.5 amperes PRICE ..... **$16.95 each**

400-CYCLE FREQUENCY METER IN PORTABLE METAL CASE



Range, 380-400 cps. 100-130 VAC. Nine vibrating reeds. Frequency increments of 5 cps. Frequency accuracy is +-0.3% at 77° F. with sine wave input. With test leads. 3¼" x 3¼" x 6". Winslow Model 360 **$12.50**

COAX CABLE RG59A/U

50 ft. roll complete with coax fittings PRICE ..... **$2.49 ea.**

All prices FOB Pasadena unless otherwise noted. No COD's.

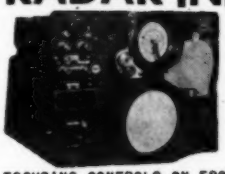
C & H SALES CO.
2176 E. Colorado St., Pasadena, Calif.
MUrray 1-7393

WORLD'S FINEST GOV'T SURPLUS ELECTRONIC BARGAINS:

BC-348 RECEIVER

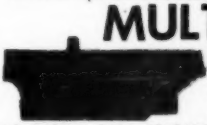
BC-348R RECEIVER AM 6 BANDS 200-500 KC. & 1.5 TO 18 MC. CRYSTAL PHASING, ANTENNA ALIGN, BEAT OSCILLATOR & AUDIOGAIN CONTROLS, VERNIER AND SPEED TUNING, OUTPUT JACKS FOR PHONES & SPEAKER. WITH TUBES 3/6K7, 1/6J7, 1/6C5, 1/6K6, 1/6B8 & 1/6F7. VOLTAGE REQUIRED 24 VOLTS 2 A. & 220 VDC 70 MA.
SIZE: 18x10½x9½; WT: 38 LBS. USED $89.50
AC POWER SUPPLY IN CABINET WITH SPEAKER WHEN PURCHASED WITH RECEIVER $20.00.
DM-28 DYNAMOTOR 24 VDC FOR REC. USED 6.95
FT-154 SHOCKMOUNTING " " " 2.75
PL-103 PLUG " " " 1.50

RADAR INDICATOR



PPI RANGE INDICATOR FOR T-9 TRACKER RADAR SET AN/GPG-1. OPERATES FROM 115 VOL 60 CYCLE WITH TUBES 3/6J6, 2/12AH7, 1/6AG5, 1/6AR6, 1/6AG7, 2/6C4, 1/12AU7, 1/30P1, 1/5ADP7 & 2/3B29 ALL FOCUSING CONTROLS ON FRONT PANEL, CHASSIS ONLY, NO COVER. SIZE: 13x11x24; WT: 80 LBS.
PRICE: EXCELLENT USED $32.50

MULTIPLEX

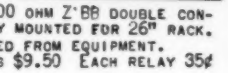


PHILCO SIGNALING & TERMINATION UNIT CST-2 STANDARD 19" RACK AND IS USED IN MULTIPLEX SYSTEMS FOR TRANSMISSIC OF NORMAL DIAL OR RINGDOWN SIGNALING AND TERMINATES THE FOUR-WIRE CIRCUIT OF THE MULTIPLEX INTO THE TWO-WIRE TELEPHONE CIRCUIT. A 3.5 KC OSCILLATOR TONE IS USED FOR SIGNALNG WITH THE USE OF HYBRID COILS AND T PAD ADJUSTMENTS PROPER ATTENUATION OF THE VOICE LEVEL IS MAINTAINED. OPERATES FROM 115 VOLT 60 CYC AND IS COMPLETE WITH 2/12AU7 TUBES, FOUR RELAYS AND INSTRUCTION BOOK. COND. UNUSED.
SIZE: 4½x19x12; SHPG. WT. 50 LBS. $9.95

STROWGER RELAY

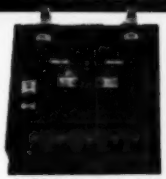
STROWGER STEP BY STEP RELAY ASSEMBLY IS USED IN CENTRAL OFFICE DIAL TELEPHONE EXCHANGE. THIS IS THE HEART OF THE DIAL TELEPHONE SYSTEM AS IT HAS THE TEN STEP BANK SELECTION AND 10 STEP LINE SELECTION TRUNK LINE SENSING MECHANISM WITH NECESSARY HOLD AND RELEASE RELAYS. (THE BANK OF ROTARY STEPPING SWITCHES IS NOT PART OF THIS ASSY)
SIZE 14x5x7; WT: 13 LBS. WE #ED55242-31G1
PRICE: USED $5.95

TELEPHONE BANK



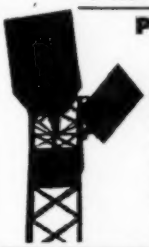
TELEPHONE RELAYS FOR LINE USE. OPERATES FROM 48 VDC, 1000 OHM Z A SINGLE CONTACT, 500 OHM Z BB DOUBLE CONTACT, 20 OF EACH RELAY MOUNTED FOR 26" RACK. SHPG. WT: 35 LBS. REMOVED FROM EQUIPMENT.
PRICE 40 MOUNTED RELAYS $9.50 EACH RELAY 35¢

CARRIER MONITOR



CARRIER MONITOR WHEN COUPLED TO AN ANTENNA TRANSMISSION LINE PROVIDES D.C. & AUDIO CURRENTS FOR INDICATION OF PROPER TRANSMITTER OPERATION AT A REMOTE POSITION. THE UNIT CAN BE USED WITH TRANSMITTERS OPERATING IN THE 2 TO 30 MEGACYCLES AND HAVING A POWER OUTPUT UP TO 50,000 WATTS. TWO HIGH VOLTAGE VACUUM CAPACITORS 3 MMFD. 15 KV. WITH SUITABLE CONNECTORS ARE PROVIDED FOR 500 TO 50,000 WAT FOR LESS THAN 500 WATTS A DIFFERENT TYPE COUPLING WILL HAVE TO BE USED. THE INPUT AND OUTPUT IMPEDANCE IS 600 OHMS, OUTPUT LEVEL - 3 DBM AUDIO FOR 100% MODULATION INTO A 600 OHM BALANCED LINE, 5-15 MILLIAMPERES D.C. INTO 100 OHM LOAD. OPERATING VOLTAGE 115/230 V 60 CYCLE WITH TUBES 1/6AL5, 1/6X4, 1/6J6 & 1/V103, POWER SUPPLY OUTPUT VOLTAGE 150 VDC @ 35 MA. UNIT ALSO HAS OUTPUT JACKS AND CONTROLS FOR TAKING LOCAL READINGS AND ADJUSTMENTS.
SIZE: 6x6½x8½; SHPG. WT: 15 LBS. P/N 1028017
PRICE: WITH 2 VACUUM CONDENSERS, CONNECTORS AND CONTBOL CONNECTOR, TUBES ETC. NEW $8.95
PRICE: LESS 2 VACUUM CONDENSERS, NEW 5.95
VACUUM CONDENSERS ONLY, EACH 1.95

PARABOLIC ANTENNA & REFLECTORS

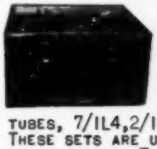


MICROWAVE ANTENNA REFLECTORS PLANE TYPE CONFIGURATION MADE OF ALUMINUM, MOUNTED BY FRAME WORK OF REFLECTOR AND BRACKETS WITH NECESSARY HARDWARE, GUYS AND ADJUSTMENT FOR ANGLE POSIT
SIZE: 8'x6'; NET WT. 125 LBS. SHIPPING WT: 375 LBS. $75.00
SIZE: 12'x8' SHPG. WT: 600 LBS
PRICE: $125.00

PARABOLIC ANTENNA REFLECTOR: DISH PAN TYPE, FOUR(4) FOOT ALUMINUM, PAINTED GREY, 21" FEED FOR APPROX. 7100 MC. THREE INCH ROUND MOUNTING FOR WAVEGUIDE SIZE 1-5/16x5/8, 4 MOUNTING STUDS WITH HARDWARE. PHILCO #463-2252-1 $29.95 WITH FEED; $25.00 LESS FEED WITH DEFROST ATTACHMENT $5.00 EX. SHIPPING WEIGHTS.
IN CARTON 75; ORIGINAL CRATE 225 LBS.

REFLECTOR ANTENNA BY ANDREW CORP #N-14519; PARABOLIC, DISHPAN TYPE UY-28; 1700 TO 1850MC FREQ. RANGE; FIXED PIPE MOUNTED, ALUMINUM REFLECTOR 6'6"; SHPG. WT: 415 LBS. UNUSED
PRICE: $49.50

BC-1335 F-M RECEIVER TRANSMITTER



CRYSTAL CONTROL ON ANY TWO PRESET FREQ. IN THE 27 TO 38 MC. BAND USING FT-243 CRYSTAL HOLDER APPROX. 2 WATTS OUTPUT. VIBRATOR TYPE POWER SUPPLY THAT OPERATES FROM 6 OR 12 VOLTS DC. USES 18 TUBES, 7/1L4, 2/1R5, 5/3A5, 2/3C4, 1/1A3 & 1/6AF6G. THESE SETS ARE USED AND SOLD "AS IS" LESS TUBES AND VIBRATOR. THEY WILL REQUIRE SOME WORK.
SIZE: 13½x12½x6½; WT: 30 LBS. USED $6.95

FAIR RADIO SALES
2133 ELIDA RD. · Box 1105 · LIMA, OHIO

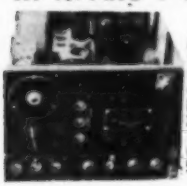
BC 1158 TRANSMITTER

BC-1158 RADIO TRANSMITTER & MODULATOR 50 WATT R.F. DOUBLER, AMPLIFIER AND MODULATOR SECTIONS, A.M 53.3 TO 95 MC. COMPLETE WITH 4/815 & 10/12SN7 TUBES. CRYSTAL CONTROL OF ANY ONE SINGLE CHANNEL. USED IN AIRCRAFT FOR REMOTE CONTROL OF RECEIVERS R-150 & R-174 SHOWN ON PAGE 14. VOLTAGE REQUIRED 24 VDC & 400 VDC @ 400 MA. (FOR CONVERSION TO 6 METERS SEE CQ MAGAZINE JAN.'57) SIZE: 8½x16½x16½; WT: 32 LBS.
PRICE: NEW $34.50

TRANSMITTER

T-14/TRC-1 FM TRANSMITTER. 40 WATT, CRYSTAL CONTROL, ONE CHANNEL, COVERING THE FREQ OF 70-100 MC WITH 30KC PHASE SHIFT FREQ. DEVIATION WHENMODULATED BY A 250 TO 12000 CYCLE AUDIO SIGNAL. OPERATES FROM 115/230 VOLT 60CY HAS 2½" METER FOR MEASURING VOLTAGES OF THE DIFFERENT STAGES AND COMES COMPLETE WITH TUBE 1/829,4/6V6,1/6SL7,1/6SN7,2/6AC7,1/816 &1/5R4 SIZE: 16½x10x12; WT:65LBS. PRICE USED: $24,95

RT-19/ARC-4 TRANSMITTER RECEIVER



AMPLITUDE MODULATED SET COVERING THE FREQ. OF 140 TO 148MC FOUR CHANNEL CTYSTAL CONTROL, OUTPUT 10 WATTS. WITH TRANSMI-REC. TUBES 2/6L6,1/832,2/1614 2/6V6,4/6N7,2/6AC7,3/12SJ7,2/12A6 & 2/12SQ7. VOLTAGE REQUIRED 325 VDC @ 255MA.&12.6 @ 5.3A OR 24 @ 2.7A. SET USUALY OPERATES FROM A 12 OR 24 VOL DYNAMOTOR WHICH CAN BE PURCHASED SEPARATELY. CONVERSION FOR TWO METERS CAN BE FOUND IN SURPLUS CONVERSION MANUAL, PRICED AT $3.00. (USED)
SIZE 10½x8x20; WT: 20 LBS. TRANS-REC. U. $22.95
DY-10 DYNAMOTOR 12 OR 24 VOLT USED $14.95
DY-9 " " " " 9.95

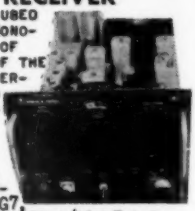
PANORAMIC RECEIVER

R-61/APA-5 DOUBLE SUPERHET RODYNE RECEIVER WITH MOTOR DRIVER CAPACITOR TUNING FOR SCANNING AM, FM, CW & VIDEO SIGNALS IN THE 18 TO 50 & 48 TO 80 MC BAND ON A 5CP1 CATHODE RAY TUBE THAT IS CALIBRATED AS TO FREQ. PRESENTATION IN THE LOW & HIGH BAND. SELECTION OF BAND.TO BE VIEWED, SELECTIVITY & CLIBRATION ARE ALL ON THE FRONT PANEL. SET IS OF UNITIZED CONSTRUCTION AND IS COMPLETE WITH 20 TUBES: 4/6AG5,2/9002,2/12SK7, ONE EACH 5Y3,2x2,VR-90,927,12SG7,12SA7,12H6, 12SQ7,12SH7,6SN7,2050 & 5CP1. OPERATING VOLTAG REQUIRED 80-115 VOLTS 400-2600CYCLES 120 WATTS & 28 VDC WITH OPERATING MANUAL & SCHEMATIC. SIZE; 10½x8x22. WT. 51LBS. PRICE, NEW...$49.50

CODE OSCILLATOR

VO-3 OSCILLATOR IS AN ELECT-AUDIO TONE GENERATOR WITH A 10 WATTS OF POWER OUTPUT AT A FREQ. OF 800 CYCLES PER SEC COND. THIS POWER IS ADEQUATE F FOR SUPPLING TONE TO 200 HEAD SETS THAT CAN BE KEYED BY THE INSTRUCTOR OR STUDENTS AND FEED INTO A SPEAKER OR RECORDER. OPERATES FROM 115 VOLT 60 CYCLE, COMPLETE WITH TUBES 1/6SN7,1/5U4 & 2/6V6GT, OUTPUT 4,8,12 & 16 OHMS. SIZE: 12½x10½x7½; WT: 24 LBS.
PRICE: USED $12.95

SONO-BUOY RECEIVER



R-156/ARR-16 FM RECEIVER USED TO RECEIVE SIGNALS FROM SONO-BUOYS IN THE FREQ. RANGE OF 62.8 TO 72.1 MC. BY USE OF THE TUNEABLE DIAL, WHICH IS VERNIER TYPE WITH COARSE AND FINE TUNING. ALSO HAS TWO AUDIO LEVEL CONTROLS, SCALE EXPANDER, PILOT LIGHT DIMMER, HEADSET JACKS ETC. IF FREQ. 8 MC. COMPLETE WITH 24 VOLT DYNAMOTOR, TUBES 5/6AK5,2/12SG7 3/12SH7,1/12H6,1/12A6,1/VR-150,1/12SN7 & BALLAST TUBE. (SEE PAGE 23 FOR SONO-BUOY TRANS.)
SIZE: 10½x8x17; WT: 27 LBS. POWER PLUG $1.50
PRICE: USED $16.95

FM RECEIVER

BC-617 FM RECEIVER & SELECTOR FREQUENCY COVERAGE 30 TO 40 MC. 10 CHANNEL TONE SELECTOR THAT ACTUATES RELAY CIRCUITS. COAXIAL ANTENNA INPUT, SQUELC CIRCUIT, AUDIO CONTROL OUTPUT JACK ETC. COMPLETE WITH TUBES 7/12SN7,1/12H6,1/12 SA7,2/12SJ7,3/12SK7 & 1/VR 105 AND 24 VOLT DYNAMOTOR.
SIZE: 11x8x20; WT: 35 LBS.
PRICE: UNUSED $24.50

GP-7 TRANSMITTER

GP-7 NAVY AIRCRAFT TRANSMITTING , FREQUENCY COVERAGE 350 KC. TO 9050 KC. BY THE USE OF SIX PLUG IN TUNNING UNITS, AM, CW & MCW OPERATION, 30-50 WATTS VOICE & 85 TO 125 WATTS CW DEPENDING ON THE FREQUENCY AND TYPE INSTALLATION. COMPLETE WITH TUBES 2/1616,1/803,1/801 1/843 & 1/5Z3, ANTENNA LOAD COIL, PILOTS & OPERATORS CONTROL BOX, COVER & MANUAL. SET OPERATES FROM 115 VOLTS 800 CYCLE AND 12 OR 24 VOLTS D.C. AS IT HAS ITS OWN SELF CONTAINED A.C. POWER SUPPLY. THE 2½" METERS ARE USED FOR MEASUREING PLATE, FILAMENT & OUTPUT. THE SET IS CONSTRUCTED OF ALUMINUM AND FIVE TUNING UNITS HAVE CARRING CASES WITH SNAP-SLIDE COVERS AND CARRING HANDLES.
TRANSMITTER SIZE: 23½x11x13; WT: 50 LBS.
TOTAL WEIGHT OF ALL THE EQUIPMENT, PACKED 200

PRICE FOR COMPLETE SET AS DESCIBED,..$34.95

GP-7 COMPONENTS INDIVIDUALY PRICED

CAY 52173	TRANSMITTER - POWER SUPPLY	$16.95
	PLUG-IN TUNING UNITS	
CAY 47150A	R.F UNIT 350-800 Kc BAND	3.95
" 47151B	" " 800-1500 " "	3.95
" 47155C	" " 1500-3000 " "	4.95
" 47152D	" " 3000-4525 " "	4.95
	FOLLOWING TUNING UNITS HAVE ROTARY INDUCTORS	
" 47153E	" " 4525-6500 " "	7.95
" 47154F	" " 6200-9050 " "	7.95
"	EMPTY CASES FOR THE ABOVE TUNING UNITS WITH SNAP COVER AND HANDLE	1.75
" 47125	ANTENNA LOAD COIL	1.95
" 23219	PILOTS CONTROL BOX	1.95
" 23220	OPERATORS " "	2.95
	INSTRUCTION BOOK	7.50

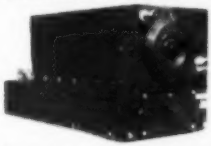
TG-34A KEYER

CODE PRACTICE SET USED TO REPRODUCE SIGNALS PREVIOUSLY RECORDED ON INKED PAPER TAPES. VARIABLE SPEED MOTOR, KEYING OSCILLATOR WITH SPEAKER AND PHONE JACK. OPERATES FROM 115/230 50/60 CYC. HOUSED IN PORTABLE CARRING CASE.
SIZE 15x10x10; WT: 40 LBS.
PRICE: RE-NEW, CHECKED $24.95

FAIR RADIO SALES 2133 ELIDA RD. • Box 1105 • LIMA, OHIO

RECEIVERS

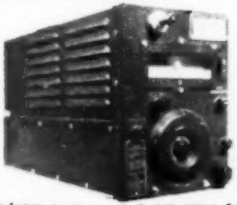
The receivers are six tube superhets using the following tubes,1/12A6, 2/12BH7,3/12SK7 & 1/12SR7. Designed to operate from 24 VDC dynamotor, which mounted on the rear of the set, suppling 250 VDC 60 MA.
Size of set 5 x 5 x 11 WT. 6 lbs.



BC-453/R-23 190 to 550 KC used $12.95
BC-946/R-24 520 to 1500 KC no stock
/R-25 1.5 to 3.0 MC used $14.95
BC-455/R-27 6 to 9.1 MC $11.95 used

TRANSMITTERS

The transmitters with proper use can put out 50 watts on CW and watts on voice, with the use of the BC-456 modulator which is a separate unit. Dynamotor used with equipment is a DM-33 24 VDC input output 575 VDC 175 MA & mounts on the modulator. Tubes used 2/1625,1/1626 & 1/1629 magic eye tube for crystal calibration
Size 5 x 7 x 12 WT.9 Lbs



T-17/ARC 1.3 to 2.1 MC NEW $14.95
T-18/ARC 2.1 to 3 MC NEW 8.95
T-19/ARC 3 to 4 MC used $8.95
T-20/ARC 4 to 5.3 MC NEW 8.95
T-21/ARC 5.3 to 7. MC NEW 9.95
T-22/ARC 7. to 9.1 MCused $14.95
T-23/ARC 100 to 156 MC NEW 16.95

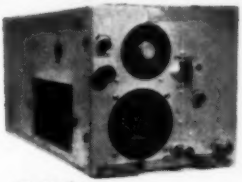
BC-456 MODULATOR AND DYNAMOTOR MOUNTING. USED WITH COMMAND TRANSMITTER COMPLETE WITH TUBES 1/1625, 1/12J5, VR-150. SIZE:7x8x10;WT:10
PRICE: USED $2.95

CD-526 CABLE 5 FT. WITH PL-153 EACH END. $4.95
CD-532 CABLE 5 FT. WITH PL-152 EACH END. $2.75

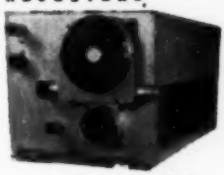
PS-274N POWER SUPPLY FOR COMMAND & ARC-5 RECEIVERS. OPERATE FROM 115 VOLT 60 CYCLE, COMPLETE WITH SPEAKER, PHONE JACK AND BFO SWITCH
PRICE: $18.95

DM-32 DYNAMOTOR 24 V U$2.95 N 4.95
35x032 " " 12 V 4.95
DM-33 DYN.F/TRAN24V. USED $2.95
SPIN TUNING KNOBS FOR RECEIVER 1.00
CONNECTOR PLUGS REC/TRANS. EA. 1.50

TRANSMITTERS - RECEIVERS



BC-230/430



BC-229/429

BC-230/430 TRANSMITTER

Transmitter approx. 10 watts Voice and 20 watts CW in the freq range of 2500 to 7700 KC by use of plug in coils.Uses tubes 2/10Y, 2/45. Output meter 2" 0 to 1.5 RF. MO control on front panel. Voltage required approx 300 VDC for plates & 12VDC for BC-230 & 24 VDC for BC-430. Size 13"x8"x 7". WT. 10½ lbs.

Price with tubes, plug in coils & schematic, USED $8.95

BC-229/429 RECEIVER

Receiver TRF ,uses plug in coils to cover the freq. range of 201 to 398 & 2500 to 7700 KC. Six tubes 1/37,1/38,4/39. Voltage required 220 VDC to 275 VDC 80 MA. & 12 VDC for BC-229 & 24VDC for BC-429. Size 16 x 8 x 7. WT 12 lbs.
Price with tubes,,plug in coils & shematic, used $8.95

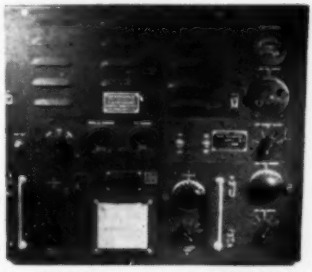
BD-83 Dynamotor 12 VDC to operate Rec & Trans. Unused $6.95

ADDITIONAL EQUIPMENT

Control Box BC-231 F/ receiver or BC-232 F/ trans. each $1.00
Connector plugs for rec, trans., dynamotor or boxes, " $1.00
Schematic showing rec, trans, boxes etc. $1.00
Tuning knob for Receiver local control $1.00
Remote tuning head for receiver $2.00
Remote tuning shaft for receiver, specify length $1.50
Separate coils for receiver, specify freq. coverage $1.75
Dual coil 201-398 & 2500-4700 or 4700-7700 each.
Separate coils for transmitter, specify freq coverage. $1.75
2500-3200, 3200-4000,4000-5000,5000-6200,6200-7700.
Mountings for Rec., Trans, Dyn., Each mounting $1.50

BC-375 TRANSMITTER BC-191

TRANSMITTER AM 100 Watt CW - MCW - Voice, Frequency coverage 200 -500 KC & 1500 - 12,500 KC. by use of plug in tuning units listed below. Tube line up 1/10Y & 4/VT-4C (211). Complete with tubes,less tuning units. Requires 12VDC for BC-191 & 24 VDC for BC-375 filaments & relay. 1000 VDC 350 MA. plates. Meters 2" for reading 0-8 RF,0-500 MA,40-15 DC. With schematics.



BC-191/12 volt Used 24.95 New $34.95 BC-375/24 volt Used $29.95

TUNING UNITS for BC-191 & BC-375

			Used	New
TU-5	1.5 to 3	MC	$2.95	$3.95
TU-6	3 to 4.5	MC	not availabl	
TU-7	4.5 to 6.2	MC	2.95	3.95
TU-8	6.2 to 7.7	MC	2.95	3.95
TU-9	7.7 to 10	MC	not available	
TU-10	10 to 12.5	MC	2.95	3.95
TU-26	200 to 500	KC	3.95	4.95

Price of tuning units less case. With case $.50 addittional.

BC-306 Antenna Tuner NOT AVAILABLE
DYNAMOTORS: BD-77/12V f/BC-191 Used $9.95: PE-73/24V NEW $12.95
PLUGS for transmitter or dynamotor ;each plug $1.00
Cables with PL-61,PL-64 or PL-59 ea end. Each cable $2.75

BA-34 POWER SUPPLY for BC-191 115/230 volt 60 cycle input output supplies all the voltages for operation. Used $59.50

FAIR RADIO SALES • 2133 ELIDA RD. Box 1105 • LIMA, OHIO

Power Transformer Filament

PRI: 115/230 V 60 cyc
SEC: 240 VCT 35 MA.
24 V .9 AMP
6.3 " .6 "
6.3 " .3 "
Size 3x3x3½ WT. 4 lbs.
Stock #RM-13-317
Price $1.25

PRI: 115/230 60 CYC
SEC: 400 VCT 4 AMP
1000 WATTS
WT:45LB
SIZE:10x8x5½
P/O RA-43 RECT.
STK# 2Z9607-3
PRICE:$6.95

PRI: 120/240
SEC: 2.5 @ 3 A.
10.2" 5 A
6.6 @10 A
420-470 @.450
347 @.03
15 @.02
6.4 @ 10A
6½x6½x5½:39 LB
No.2Z9623.3 $4.95

TYPE AS FAIR#617
PRI: 115 V 60 CY
SEC: 550CT 150 MA
12 V 4 A.
5 V 3 A.
SIZE:4x5x4; 7 LBS.
STK# FAIR-1490
PRICE: $7.95
DESIGNED F/BC-923

TYPE AS FAIR#617
PRI: 115 V 60 CY
SEC: 500CT 125 MA
24 V 2 A.
5 V 3 A.
SIZE:4x5x4; 6½ LB.
STK#FAIR-1424
PRICE: $6.95
FOR R-77/ARC-3

PRI: 115 V 60 CY
SEC: 500 CT 80 MA.
24 V 2 A.
5 V 3 A.
SIZE:2½x2½x3½ 3LB.
STK#FAIR-818
PRICE: $4.95
FOR BC-603,683
COMM/ARC RECEIVE!

PRI:115/230 60 CY
SEC:600 CT 100 MA
12.5 " 3 A.
12.5 " 3 A.
5.0 " 3 A.
SIZE:3½x3x4;WT:5½
STK#2Z9828
USED WITH RA20
PRICE:$3.95

PRI: 115 V 60 cyc.
SEC: 624 CT. 70 MA.
6.3 2.1 AMP.
5 3 "
Size3½x4x6 WT. 8 lbs.
Stock # 2Z9611.39
PRICE: $1.95

PRI: 115 V 60 CIC
SEC: 660 CT 100 MA.
6.3 5 AMP.
5 3 "
Size 4x5x4½ WT. 9½ lb
Stock # 6J23
Price $3.95

PRI: 115 V 60 CY
SEC:
675 VCT 500 MA.
150 " " "
27 V. " "
6.3 V. 10 A.
5.0 V. 6 A.
6x7½x6½: 45 LB.
#PI-3230)
PRICE: $6.95

PRI: 115 V 50/60-60C
SEC: 720 CT/200MA
12.6 3 A
6.6 10 A
5.25 3 A
S/5x4½x5½.WT:
STK.# 203533
PRICE: $4.95

PRI: 115 60 CYC
SEC: 720 CT 120 MA
5 3 A
6.3 CT 4 A
6.3 CT 1 A
SIZE:4x5x4½ WT.9 LB
STK#RI7T7557
PRICE: $2.95

PRI: 115/230 60CY
SEC: 750-0-0-750
.66AMPS@1.66
SIZE:13x10x11
WT: 115 LBS.
STK#2Z9607-16
PRICE: $29.50

PRI: 115/230 60 cyc
SEC: 800 CT. 120 MA
6.4 4.5 AMP
5 2 "
6.3 .6 "
6.4 450 MA
Size5x5x6 WT. 13 lbs.
Stock # 2Z9621-380
PRICE: $2.95

PRI: 115 50/60 CY
SEC: 815 CT 150 MA
5 3 A
6.3 4.5 A
SIZE: 4x5x4½ WT 12
STK.# 2Z9613.1
PRICE:$2.95

PRI: 115 V 60 CY
SEC: 820CT 120 MA
5 V 2 A.
SIZE:4x6x3½ 10 LB
STK#ORD7629820
PRICE: $2.95

PRI: 115 V 60 CY
SEC: 880CT 260 MA
SIZE:4½x5½x4 10LB
STK#7629825
PRICE: $4.95

PRI: 115/230 60 CY
SEC: 980 CT 390 MA
SIZE:6x5½x4 WT.13
STK# 2Z9621-583
PRICE: $7.95

PRI: 230/460 60CY
SEC: 1025 CT350MA
4 60"
SIZE:4½x6½x6½ 32LB
STK#2Z9601.84
PRICE: $2.95
USE TWO FOR 115 V

PRI: 115 V 60 cyc.
SEC: 1080 CT.142 MA.
6.3 1 AMP.
6.3 2 AMP.
5 3 AMP.
Size 5x5½x5½ WT.14 lbs
Stock # 2Z9613.52
PRICE: $3.95

PRI: 115 V 60 CYC.
SEC: 1100 V 75 MA.
7.5 3.25 AMP.
Size 4x5x5 WT. 10½ lb
Stock # 2Z9812
PRICE: $2.95

PRI: 120 V 60
SEC: 1170 VCT
325 MA.
5x7½x4: 28 LBS
#8568966-P1
PRICE: $7.95

PRI: 115 V 60 CYC
SEC: 1200 CT 150MA
300 CT 50MA
6.3 4 A
6.3 3 A
6.3 CT .6 A
5.0 6.0A
45 50 MA
4½x5½x7; 23 LBS.
#2990 $3.95

PRI: 115 V 60 CIC.
1200 200 MA.
12.5 2 AMP.
12.5 2 AMP.
5 3 AMP.
Size4x4½x4½ WT. 10 lbs
Stock # FAIR-617
Price $8.95
DESIGNED FOR COMMAND
TRANSMITTER

PRI: 115 v. 60 CY
SEC: 1540 CT.166A
1230 CT.257A
BOTH VOLTAGES ONE
WINDING
5.1 4.5A
6.5 4.0A
6.5 .5A
7½x6x6½; WT:35 LBS
STK# 2Z9613.53
$7.95

PRI: 210/230 60CY
SEC: 3000 700 MA.
TAPPED;1500,
2100 & 1050
SIZE:14x11x9 150LB
STK# 2Z9607-14
PRICE: $34.95

PRI: 115 60 cyc
SEC: 2400 CT 106 MA.
Size 7x4½x6½ WT.25 lb
Stock/2Z9614-152
Price $5.95

IGNITION
TRANSFORMER
PRI: 115 VOLT 60CY
240 VA.
SEC:10,000V 23 M.A
SIZE:5x5x8;WT:14LB
STK#IOEXH-1-3
PRICE: $7.95

PRI: 120 V 60 CY
SEC: 2.5 V 10 A.
NO C.T. INS.10M.
4½x3½x5; 8 LBS.
#2Z9611.144
PRICE: $2.95

PRI: 115 V 60 CYC
SEC: 5 V 6 AMP
SIZE:4x3x3½ 5 LBS.
STK# ORD7629812
PRICE: $1.95

PRI: 210-240 60 CY
SEC: 5 CT 10 A
SIZE: 5x5x4½ WT13
STK.# 2Z9600.42
PRICE:$2.95

PRI: 115 60 CYCLE
SEC: 5.7 21.8 AMP.
SIZE:5x4½x5½ :5 LBS
STK# 2Z9611.104
PRICE: $3.95

PRI: 115 V 60 C
SEC: 6.3 V 3.6 A
15 V.004 A
15 V.004 A
SIZE:3x3½x3;4 LBS
STK#ORD7629806
PRICE: $1.95

PRI: 115 V 60 CYC
SEC: 6.3 V 2.7 AMP
SIZE:2½x2x2½;1½LB.
STK#5950-186-9789
PRICE: $1.50

PRI: 115 V 60 CYC
SEC: 6.3 V 4 AMP
SIZE:4x3x3½ 5 LBS.
STK#ORD7629823
PRICE: $2.50

PRI: 115 V 60 CYC
SEC: 6.3 V 2.75 A.
6.3 V 5.5 A.
SIZE:3½x4½x3:5LBS
STK#ORD7629805
PRICE: $2.95

TRANSFORMER
PRI:70/100/140/200
60 CYCLE
SEC: 12.6 CT .7 A
6.3 CT .9 A
6.3 CT 1.5 A
6.3 CT 1.5 A
2.5 KV TEST
SIZE:5½x3x4 WT 5LB
STK# GE#7465625-P1
PRICE: $2.95

PRIMARY VOLTS
81,163 & 230
50/60 CYCLE 15V
SECONDARY VOL 3A
11.7 CT.3½ A.
WITH 115 VOLT
INPUT, OUTPUT
WILL BE 15 V.3 AMPS
SIZE:3½x4x3½:8 LBS.
GE#7465106-P1 $2.95

PRI: 115V 60 CYCLE
SEC: 12 V 2.1 AMP.
SIZE: 3x3x2½:3LBS
STK#TR-1409/8970
PRICE:$1.50

Same style as #5005
PRI: 115 V 60 CYC.
12.5 V 1 AMP.
Size 2½x2x2½ Wt. 1½lb
Stock # FAIR 2468
Price $1.75

PRI: 115 V 60 cyc.
SEC: 12.5 V 2 AMP.
12.5 2 "
Size 4½x4x2½ Wt.5½ lb
Stock # FAIR-5005
PRICE: $4.95

PRIMARY VOLTS
81,163 & 230
50/60 CYCLE
SECONDARY VOLTS
12 CT. 3½ AMPS
12 CT. 3½ "
13 CT. 10 "
@ 115v 2/16v-3A
1/17v 10A.
SIZE 4x7x7 18LBS.
GE#7466333 $5.95

PRI: 115 60 cyc
SEC: 12.6 CT 3.5A
15.6 1 A
SIZE:3x3½x4½ 5LBS
STK# 672N243
PRICE:$2.95

PRI: 120/240v 60c
SEC: 16 v 8 AMP
16 v 8 "
SERIES SECONDARY
32 v 8 AMP
PARALLEL 16v16 "
4½x4x4½: 3 LBS.
#1479-L018
PRICE: $7.95

Same style as #5005
PRI: 115 V 60 cyc
SEC: 24 V 1 AMP.
Size 2-3/4x2½x2WT.2lb.
Stock # FAIR-718R
Price $1.95

PRI: 115 V 60 CYC.
SEC: 24 V 4 AMP.
SIZE:4x3½x3 5 LBS.
STK#307074-1/24V
PRICE: $3.95

PRI: 115 v. 60cy
SEC: 24 V. 1.5 A
5 V. 6.0 A
6x4½x2½; WT: 8LB
#2Z9621-508 $1.95

PRI: 115 v. 60 CY
SEC: 2.2 v.
ALSO TAPPED WIND.
0-60v 10 TAPS 4
VOLTS EA. 1 TAP
20v.HV AMPS 4,LOW
EST VOLTAGE 20 A.
6x4x5; WT: 25 LBS
#6120-473-6811
$7.95

PRI: 115 V 60 CYC
SEC: 70 CT 2 AMP
2 CT 24 "
5.4 V 4 "
SIZE:5x5x4½ WT.13
STOCK#702770
PRICE:$2.95

I-177
TUBE CHECKER
TRANSFORMER
SIZE: 4½x4x4.5½LB
STK.# 2Z9613.667
PRICE: $4.95

FAIR RADIO SALES LIMA, OHIO

Chokes Modulation Telephone Headsets Mics

5 HY 50 MA. 250 OHM. 2x2x2½" WT. 1½ Stock# 3C367-2 PRICE: $.75

6 HY 75 MA 150 OHM 3x3x2½ WT:2½ STK#3C316-7 PRICE: $.79

17 HY 80 MA. 300 OHM 2½x3x2½" WT. STK#3C326-318 PRICE: $.75

DUAL CHOKE 11 HY 100 MA. 200 OHMS. 4x4x5½"WT.8 lb ST.#3C557F-1 PRICE: $ .75

14 HY 125MA 275 OHMS. 2½x3½x5½; 308-708-060 $1.25

10 HY 150 MA 150 OHM 3½x3½x4 WT:5½ STK#3C323-6Z5 PRICE: $1.50

25 HY 160 MA 350 OHM 3½x3½x4½; WT: 8LBS 3C317-38 PRICE: $1.75

15 HY 165 MA 135 OHM 4x4x3½;WT:7½ STK#3C323-4 PRICE: $1.75

8 HY 200MA 90 OHM 3x3x3½ 7LBS 310-190-024 $2.25

10 HY 250 MA 52.5 OHMS 7x5x4 WT 17 LB STK#3C577-16 PRICE:$2.95

10 HY 250 MA. 110 OHM 5½x5½x4½; WT:15 STK#3C336-52 PRICE: $2.95

11 HY 300 MA 125 OHM 5x5x3½; WT:12 LB #3C369-11 PRICE: $5.95

15 HY 350 MA 5x5x6 WT: 18 STK#3C549-2 PRICE: $6.95

10 HY 500 MA 45 OHM 4½x5½x5½; 28 LBS #L-5360 PRICE: $6.95

5 HY 500 MA 28 OHM 4½x5x3½ WT9½ STK#3C1987-72 PRICE: $3.95

5 HY 690 MA. INSUL. 6 KV. 7½x6½x6: WT: 30LB #3340/307/768/499 PRICE: $7.95

3.9 HY 950 MA. TAPPED 2.7 HY. 25 OHM DC,2500VRMS SIZE:11x8x7;WT:45 STK#3C315-16 PRICE: $14.95

AUTO - ISOLATION STEP UP-STEP DOWN PRI: 95,105,115, 125,190,210,230, 250,50/60 CYCLE 600 WATT. SEC: VOLTAGE DEPENDS ON WHAT PRI., TAPS ARE USED. SIZE:5x7x5 WT.16 STK:# 2Z9605.3 PRICE:$7.95

MODULATION TRANSFORMER Watts 20 Response Response 200-5000-1DB Pri.Z 6000 SEC.Z 6000 Collins #677-2010-00 Size 2½x2½x3½ WT.3½lbs Stock# 2Z9634.53 Price $2.95

MODULATION TRANSFORMER 100 Watt RESPONSE 200 to 5000 PRI: 7000 SEC: 7000 F/BC-191/375 TRANS. Size 3x4x5 WT. 5½ lbs. Stock # 2c6191/T1 Price $3.95

MODULATION TRANSFORMER WATTS: 75 PRI: 200-250 OHM SEC: GRID 813 TUBE WITH SIDETONE Size:2½x3½x3½WT2½ STK#GE7465620-1 PRICE:$2.95

MODULATION-TRANS. 200 WATT 200-15000CY 1DB PRI. P.P PLATES 5400 OHM. SEC: 600 OHM C.T 50 V.C.T. 2400 OHM 350 MA. 4x5½x4½; 12 LBS. #677-0388-00 PRICE:$4.95

H-22/U HANDSET with retractable T cord,PL-68 Mic.& PL-55 Phone Plugs. Butterfly switch. New $4.95

TS-13 Handset with T cord PL-68 Mic. & PL-55 Phone plugs. Used $2.95 W/butterfly switch

TS-9 Handset No Plugs with switch & lugs. Used $2.95 New $3.95

Handset Hanger rubber covered as illustrated. $1.50 each 3/$4.00

CARBON MICROPHONE CM-1-SC Mobile type 85 Ohms DC Response: 200-4000C.P.S. Bypasses for R.F. DPST push to talk switch normally open. 4 ft. cord no plug $6.95 with PL-68 plug 9.95

T-26 MICROPHONE Carbon w/ switch,chest straps & 8 Ft. cable. New $1.75

T-17 MICROPHONE Carbon hand type with push switch RE-COND $5.95

HS-33 HEADSET 600 OHM IMPEDANCE LEATHER HEADBAND 18" CORD W/PL-54 W/RUBBER CUSHIONS USED $3.95 NEW 6.95 W/CHAMOIS CUSHIONS USED $4.95 NEW 7.95

HS-23 HEADSET 2000 OHM IMPEDANCE LEATHER HEADBAND 18" CORD W/PL-54 W/RUBBER CUSHIONS USED $2.95 N$5.95 W/CHAMOIS CUSHIONS U $3.95 NEW $6.95

HS-30 HEADSET 250 OHM IMPEDANCE HEARING AID TYPE EAR PCS. FIT INSIDE EAR. LIGHT-WEIGHT HEADBAND, CORD 9" LG. WITH SPADE LUGS. NEW $1.00

CD-307 CORD EXTENSION FOR CORDS WITH PL-54 PLUG AS USED ON HEADSETS, 65"LG WITH JK-26 JACK & PL-55 PLUG. NEW 89¢ USED 69¢

COILED CORD SETS
THREE CONDUCTOR
24" TO 72" 75¢
12" TO 36" 50¢
FOUR CONDUCTOR
12" TO 36"$1.00

CD-604 CORD WITH IMPEDANCE MATCHING TRANSFORMER 500OHM TO 4000,USED WITH HS-30 HEADSET, 6" CORD & PL-54 PLUG. NEW 50¢ USED 25¢

EE-8 FIELD TELEPHONE- EE-8 FIELD TELEPHONE: Can be used for private telephone system in home, factory, farm, garage etc. Operates from two flashlight batteries up to 17 miles. Uses two conductor wire for two or more phones. Magneto ringer for calling. With carring case & straps. Used checked $12.95 Two for $25.00

SOUND POWERED HANDSET WITH COILED CORD 1-41 STK#D173012 NEW $7.95 HANGER ONLY $1.50

ANTENNAS

Mast Bases

MP-22 Side mount swivel mast base will tip to 90° either right or left. Has a spring snap lock in the vertical position, will take either the MS-53 or MS-54 mast sections. Size Mtg. plate 5" 6" X 10½" high. Wt. 9 lbs. Price.....$2.95

MP-22A Same as above except mounting hole is for the MS-51 with the MS-49, MS-50 and MS-51. This will make a 9 ft. tapered antenna. Price $2.95

MP-33 A heavy weight spring mast base for the MS-53 or MS-54 with 5" phenolic insulator. 10½" high. Requires a 2" Mtg. hole. Wt. 8½ lbs. Price$3.95

MP-48 A rugged mast base with the insulator above the spring will take the MS-53 or MS-54 mast sections. Size 3"D. X 16½"H. Wt. 11 3/4 lbs. Price.....$2.95

Mast Sections

3 ft. Tubular steel, cooper coated and painted sections. These screw together to make any desired length. MS-49 being the top & smallest section increasing in size through MS-50-51-52-53 to MS-54 being the larger one. Either the MS-53 or MS-54 will fit together to form any additional heighth desired. Example a 33 ft. vertical may consist of one each MS-49, 50,51,52, and 7 each of MS-53 or it may be finished out on the bottom with 6 MS-54 sections. Self support to about 18ft. Average Wt.app. 3/4lbs. MS-49-50-51-52-53 .50¢ea. MS-54 .75ea

GROUND PLANE ANTENNA $10.95

Ground plane antenna to cover 20 to 50 MC. Made from surplus insulated base & screw in type mast sections. Mounts on 1 to 2 inch pipe. Specify operating frequency range.

SEND TODAY FOR CATALOG

FAIR RADIO SALES

Address Dept. 73 • All Prices F.O.B., Lima, Ohio. $5.00 Minimum Order. 25% Deposit on all C.O.D.'s.

The WORLD'S FINEST SURPLUS BARGAINS!

PANEL METERS

VOLTMETERS

0-150 AC	Round flush type for 2-1/8" hole, Bakelite case. Westinghouse type NA-33, 25 to 125 cycles. Signal Corps No. 3F8150-69	6.25
0-300 AC	3" round flush type, bakelite case, Simpson and General Electric Mfg. Signal Corps No. 3F8300-28	7.50
0-15 AC-DC	Voltmeter 2½" RD. USED No.IS-122	2.95
0-30 DC	Round flush type, for 2½" hole. General Electric Mfg. Model 85W53AA1. Stock No. 2DA7	5.75
0-300 DC	Round flush type, bakelite case, shielded, for 2½" hole. Sun Mfg. Model 2AU346. Stock No. 159E-12	5.75

MILLIAMMETERS

0-3 DC	Full scale 3 MA. 2½" RD." No.IS-171	2.95
50-0-50 DC	3" round flush type, bakelite case. Sangamo and Weston model 301. Signal Corps No. 3F3327	6.25
0-500 DC	Milliamp."2½"RD USED No.IS-22	2.95
0-100 DC	3" round flush type, bakelite case. De-Jur model 310. Signal Corps No. 3F910-1	6.95
0-800 DC	3" round flush type, bakelite case, calib. for 1/8" steel panel. Signal Corps No. 3F980-2	6.95

R.F. METERS

0-8 RF	AMMETER 2½" RD. USED No.IS-89	2.95
0-10 AMPS	2-3/4" flange, for 2½" hole, bakelite case. Weston model 507, Signal Corps No. 3F1010-24	5.95
0-1 AMPS	3" round flush type, bakelite case, Triplett model 0341-T or Weston model 425. Signal Corps No. 3F1001-31	6.25
0-100 MA	For 2-1/8" hole, metal case. Calib. for 1/16" steel panel, with Thermo-couple. General Electric model AAN21, type DW-52. Signal Corps No. 3F912	5.50

AMMETERS

0-30 DC	3" round surface mounting. Roller-Smith type TDS. Signal Corps No. 3F1030-9	6.95
0-30 DC	2" round flush type, metal case. Hoyt Meter Co. No. H17-3, scale has marking for 12 volt and 6 volt. Signal Corps No. 3F1030-22	5.50
0-1.5 DC	Milliamp.Tube checker scale	
	2½" flush mtg.P/O I-56A W.No.685-2	2.95
0-75 AC	Ammeter less shunt 3½"RDN No.331JP	3.95

DC AMPERES
2-3/4",0-1sc
0-10KILOVOLT
SCALE REQ. 1
AMP. SHUNT.
BASIC FS 1MA

GE# KS-14346
TYPE#A268AY1
$3.95

DC VOLTS
2½" 0-500SCL
BASIC FS 500V
RUGGEDIZED
ALUMINUM PAN-
EL ASSY.

BURLINGTON
STK#3F8C10-33
$3.95

MICROMHOS
DYNAMIC MUTU-
AL CONDUCTANC
USED IN I-177
TUBE CHECKER
BASIC 0-1.4
MA.
HICKOK#547A
STK#3F1350
$4.95

AC AMPERES
25-125 CYC.
4" 0-200 SCL
CURRENT TRAN.
RATIO 40/1
BASIC F.S 5A

WEST#8055-2
STK#3F1002-41
$5.95

DC AMPERES
3½"0-300SCL
USE W/SHUNT
50 MV/200 A

WESTON-M-643
ORD#173030
$6.95

DC AMPERES
PORTABLE 5"
MIRROR SCALE
3½"0-.1,0-1
& 0-10; EXT-
ERNAL TERMIN-
ALS F/LEADS.
SUN ELECTRIC
MODEL AM-2
$12.95

DC AMPERES
2-1/16"
0-120 SCALE
EXTERNAL
SHUNT REQ.

AERO#C-120
NSD#R17A5730
$1.95

TUNING METER
2" TUNE FOR
MAX. SCALE.
2 MA. RIGHT,
5 MA. LEFT.
5 OHM DC RES.
USED IN RADIO
COMPASS REC.
#1-70 $1.50

D-C MILLIAMP
3" SQ.
0-50 SCALE
0-1 MA.BASIC
GE Type#DO53
#7764612PT6
$2.95

DC KILOVOLTS
2-3/4"
0-20 SCALE
BASIC MOVE.
FULL SCALE
1 MA. EXTERN
AL SHUNT REQ.
WEST#43524-2
$2.95

DC MILLIAMPS
2-3/4"
0-50 SCALE
BASIC MOVE.
FULL SCL 50MA

VARIOUS MFG.
USN#CV22056
$2.95

AC VOLTS
400 CYCLE
2-3/4"
0-150 SCALE

WEST#29566N2
FED#7608430
$2.95

DC MILLIAMPER
2-3/4" 0-15
& 0-300 SCALE
0-300 SCALE
USE EXT.SHUNT
.35 OHM
USED W/BC-669
VARIOUS MFG.
STK#3F930-14
$4.95

"S" METER.
1-3/4"; 1 MA
FULL SCALE,
100 MV,DC.
SLIGHTLY OFF
CALIBRATION.
MODEL 182
#MR15SIDIDCAV
$2.50

MILLIAMPERES
0-5 DC KILO,
0-10 DC MA
SCALE. 2-3/4"
BASIC MOVE.
1 MA. F.S.

#8-55A-1164
$2.95

SEND For FREE CATALOG

WESTON METERS

D-C MILLIAMMETERS
MODEL#301 3½"RD
0-50 0-200
0-100 0-300
$6.95 EACH.

A-C MILLIAMMETERS
MODEL#476 3½"RD
0-150 0-250
$6.95 EACH.

D-C VOLTMETERS
MODEL#301 3½"RD
0-150 0-300
0-200 0-350
0-250 0-500
$6.95 EACH.

A-C VOLTMETERS
MODEL#476 3½"RD
0-10 0-150
0-100 0-500
$6.95 EACH.

WESTON	TYPE	SCALE	PRICE
#433	A.C VOLTMETER	0-150	$39.50
#932	A.C VOLT/1000 OHM PER VOLT		
"	" " "	0-3/15/75	49.50
"	" " "	0-30/150/300	49.50
#931	D.C " "	0-500	49.50
#432	WATT METER	A.C 0-350/750	75.00

ALSO AVAILABLE AC & DC MA. VARIOUS SCALES

CABINET RACKS

15" DEEP
FOR 19" PANELS
(LESS PANELS)

TOTAL HEIGHT	PANEL SIZE	PRICE
10¾	8¾	$3.95
15¾	14	6.95
19¾	17¾	7.95
28¾	26¾	10.95
36¾	35	12.95

SLOPING PANEL
CABINETS
18¾Wx10Hx10¾D
$2.95 NO PANEL

MINIMUM ORDER $3.00

GENERAL ELECTRIC

A-C VOLTMETER
TYPE AO-22 3½"RD 0-15 SCALE
25-133 CYCLE $2.95

D-C VOLTMETER
TYPE DO-41 3½"RD.
0-150 SCALE $2.95
0-4 KILOVOLT SCALE $2.95
0-1.5 " " " $2.95

D-C MILLIAMMETERS
TYPE DO-41 3½" RD
0-200 OR 0-750 SCALE $2.95
EACH

RF AMMETER
TYPE DO-44 3½"RD.
0-20 SCALE $3.95

TIME METER
MODEL 8KT8E125 3½"RD.
10/12 VOLTS 60 CYCLE $6.95

ADDRESS DEPT. 73 • MINIMUM ORDER $3.00 • PRICES F.O.B. LIMA, OHIO • 25% ON C.O.D. ORDERS

FAIR RADIO SALES • 2133 ELIDA RD. Box 1105 · LIMA, OHIO

COMMAND EQUIPMENT

R28/ARC5 - VHF Receiver - 100 to 156 mc - $19.95
BC946 - Broadcast Receiver - 550 to 1500 kc - $24.50
T18/ARC5 - Transmitter - 2 to 3 mc - $7.95
T19(BC696) - Transmitter - 3 to 4 mc - $9.95
T20(BC457) - Transmitter - 4 to 5.3 mc - New $7.95 Used $4.95
T21(BC458) - Transmitter - 5.3 to 7 mc - New $7.95, Used $4.95
MD7 - Push-Pull Modulator - New $7.95, Used $4.95
BC 442 - Antenna Meter Less Vac. Cap. - Used 98c

Schematics and/or conversion data is supplied in most cases. Mounting racks, cable connectors, controls, flex cables and most accessories are available.

BC 1206 - Receiver - 200 to 400 kc - Less Tubes $1.95 ea., 3 for $5.00

R77/ARC3 - Receiver - 100 to 156 mc AM - $19.95

RCA - #WV97A - Vacuum Tube Voltmeter - Less Probe $27.50

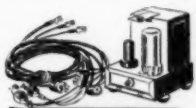
Hickok - #110B - Vacuum Tube Voltmeter - Less Probe $9.95

Cathode Ray Tubes - 3AP1 - $1.95; 3CP1 - $1.95; 5FP7 - $1.95; 5JP2 - $1.95; 5AP1 - $1.95; 5JP1 - $2.95; 5CP1 - $5.95; 902P1(2") - $3.95; 5LP1 - $4.95; Mu metal shield for 3" tubes - $1.95; 5" shield - $2.25

Transformers - 1000vct - 500 ma - $7.95; 400-0-400 - 175 ma - 12.6, 3A - $3.95; 2100v - 100ma - $1.95; 400-0-400, 100ma, - $1.95

Chokes - 11H, 500 ma - $6.95; 5H, 350ma - $3.95; - 15H, 420 - $4.95; 10H, 720 ma - $15.00; 12H, 150 ma - $1.50.

Capacitors - 4 mfd, 3000 vdc - $4.95; 2 mfd, 3000 vdc - $2.95; 2 mfd - 1000vdc - $1.00; 2 mfd, 4000 vdc - $4.95



6 VOLT RADIART VIBRAPACK SUPPLIES 300 V DC, 90 MA

Radiart 6821A (RCA MI-8319A) used to mobilize AR-77 & AR-88 rcvrs. Input 6 to 8.5v dc as selected by a 4-position switch to xfrmr taps. The vibrator is Mallory 634C or Radiart VN-10 or any 4-pin non-synch replacement. At full load, the pack draws 12 amps. A 15A fuse is in the battery cord furnished. An OZ4 tube rectifies. Output is filtered. New, with instruction book, schematic, & parts list. Shpg wt 12 lbs. Cat. No. 806VP1. Only.. **$7.95**

TG34A - Code Practice Set - New $24.95, Used $19.95 Tapes (up to 4 rolls) at $1.50 ea.
Hallicrafter SX-110 - Receiver - excellent - $105.00
R105/ARR15 - Receiver 1500 to 18500 kc - Excellent - $69.50
R584/MRC20 - Receiver 1500 to 18000 kc - Excellent - $99.50
Dumont - Model 294A Oscilloscope - Less Cable - $175.00
TS182 - Scope - Receiver - 60 cycle power - $29.50
MTI - volt-ohm-ma meter - (Pocket Model) - New $6.95
Tape Recorder Amplifier - chassis less tubes - $5.95
R4/ARRE - 234-258 mc - Receiver - w/eleven tubes - $4.95

T61/AXT2 - TV Transmitter (420 mc) - $15.95
BC375E - Transmitter with one tuning unit - $14.95
T67/ARC3 - Transmitter - 100-156 mc - $19.95
BC433 - Broadcast band receiver - $9.95
BC1158 - Six Meter Transmitter - $39.95
APX6 - Transponder (1250 mc) - $19.95
APS13 - Transceiver 420 mc - less tubes, with data - $4.95
ID59/APA11 - 3" scope for panoramic adaption - $19.95
BC929 - 3" scope for monitor conversion - $9.95
APA17 - 5JP2 Radar scope with 10 tubes - $9.95
SCR522 - 2 meter transceiver with 19 tubes - $19.95
Need squelch? Add $4.00 for "C" model.
TS34/AP - Test oscilloscope ready to go on 60 cycles - $39.95
ART13 - 100 W Transmitter to 18 mc - $47.50

PRECISION VERNIER DIALS

8:1 RATIO precision vernier dials with a heavy black bakelite base and nickel-silver dial plates with deeply etched, clearly legible scales. Moulded knob with fluted grip. Internal parts of phosphor bronze and brass for long-life dependability. Calibrated 0 to 100 in 180° rotation. For front panel mounting. Choice of four sizes.

1 1/2" Diameter.. .....$1.19
2" Diameter..... 1.39
2 7/8" Diameter..... 1.89
4" Diameter..... 2.90

ANTENNA WIRE - Copper Weld #14 gauge, 2200' coils - $7.50
RG8A/U - 35 feet w/ PL259 each end - $3.69; 3 for $10.00
RG8A/U - 15 feet w/ PL259 each end - $1.69; 7 for $10.00
RG 54 - 65 feet - $2.50; 370 feet $9.95
PL259 - 43c; SO239 - 25c; PL359(L) - 25c; PL258 double female 59c;
UG175 insert - 15c; BNC-UG88 - 39c used, 49c new; UG 290 - 39c used;
RT Angle - 49c; "T" - 98c.

See our other ad, page 118

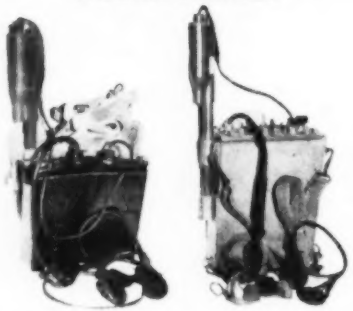
SPECIAL: **BC906** - Frequency Meter - 150 to 235 mc - In handy carrying case - 500 microamp meter and National 4" velvet vernier worth far more than the special price of $5.95 used. A few brand-new units are available at **$12.95.**

Microphones - T17D - $7.95; RS38 w/ coil cord - $7.95; carbon hand mike with switch - $2.95; Crystal mike - $2.95.
Polar Relay - Sigma 80030 - SPDT 5000 ohm 50 ua - $1.95
Plate Relay - Sealed - 3PDT - 3500 ohms - $1.95
6VDC Relay - Sealed - 3PDT - 39 ohms - 95c
115 VAC RELAY - 4PDT - Low Current Drain - $2.95
Tubes - 813 - $8.95; 832-A - $3.95; 4X150A - $8.95; 304TH - $27.50; 8025 - $1.50; 6L6 - $1.00; 3C45 - $2.50; 707B - $1.50.
Motor - Fasco Type 6 - 115V, 60 cycle, .7A, 1550 rpm, 3⅜" dia. X 2½" - shafts ¼ X ½; ½ X 1½. - shipping wgt. 3½ lbs. - $1.98 ea., - 3 for $5.00
182 - Antenna Azimuth Indicator - 5" - 360 degrees - adjustable scale - works on 12 to 24 vac 60 cycle - By using 2 units, you have both transmitter and indicator - with instructions - 4 lbs. - $5.95 pair
1101C - Meter with two 150-0-150 microamp movements - 3 lbs. - $2.95

Arrow SALES, CHICAGO, INC.
ELECTRONIC DISTRIBUTORS
2534 SOUTH MICHIGAN AVENUE • CHICAGO 16, ILLINOIS • CALUMET 5-4750

TELEMARINE FOR THE BEST IN SURPLUS!

WALKIE-TALKIES



MODEL "MAB" is a **Navy Walkie-Talkie which provides** single-channel, crystal-controlled reception and transmission (AM) between 2.0 and 4.5 MC. Receiver uses miniature tubes in a **superheterodyne circuit** for maximum sensitivity and selectivity. Transmitter employs miniature tubes in a crystal-controlled oscillator (1T4), a 3B4 RF Power Amplifier which will deliver from 200 to 250 milliwatts RF power to the antenna (can be souped up), and a 3B4 Heising (plate) Modulator stage. 7 tubes total in trans-receiver. Unit is housed in a water-tight bakelite case, 7½"H. x 10"W. x 3-9/16"D. **RANGE 1 MILE OR BETTER,** depending on location and conditions. Requires 135 volts "B" and 1½ volts "A" batteries. Excellent for 75 meter Ham, CD, Fire Dep't, emergency marine, or conversion to other uses. Supplied Complete with all tubes, r'c'ving & x'mitting crystals (sorry, we cannot accept orders for a specified frequency. Crystals are FT-243 type, and can be easily changed), telescopic antenna with adjustable loading coil, headphones, microphone, and canvas carrying case with straps. In Almost-New condition, but not-tested at this price. Shpg. wt. per set 15 lbs. **EACH** ..... **as described, only $12.95**
PER PAIR ..... **2 Complete Sets, as above $24.50**

MODEL DAV is a Navy Walkie-Talkie, same as above, but with Direction Finding Loop within so that receiver section may be used for D.F. or Homing on the crystal-controlled receiving frequency. Same transmitter as outlined above for Walkie-Talkie use with supplied adjustable telescopic antenna. Encased in watertight, sturdy plywood case, slightly larger than above. Shpg. wt. Complete with accessories as for MAB. 20 lbs.
EACH, AS NEW—but not tested at this low price **$16.95**

INSTRUCTION BOOK FOR MAB OR DAV ..... **$ 1.00**
only with purchase of units

MINIATURE VIBRATOR PACK FOR MAB OR DAV, eliminates nuisance and expense of dry batteries. Operates from miniature 6 volt storage battery, not supplied, available from many surplus dealers. With Instruction Book. Shpg. wt. 5 lbs. UNUSED. **EACH** **$7.95**

BC-611 WALKIE TALKIE CHASSIS. Brand New and Boxed, with Antenna, but less tubes, coils and crystals. **EACH $8.95**

12 V DC I, 12 HP DC MOTOR. Make boat electric winch, electric car or tractor for kiddies. Rated 1/12 HP at 1725 rpm. but with built-on reducing gear assembly actually develops more power at final speed of 43 rpm. 7" heavy brass worm gear available separately for 2½ rpm. NEW material.
MOTOR ..... **EACH $12.95**
WORM GEAR, 7" for 2½ rpm. **$2.75**

TG-34 CODE PRACTICE SETS, learn to copy code with the best device made. Less than 5 to 25 words per minute at your finger tip. Like New condition. Shpg. wt. 55 lbs.
EACH **$29.95**

RA-20 POWER SUPPLY. To convert BC-312 Receiver to 110 V AC operation.
USED—GOOD $14.95 each **NEW UNITS $17.95 each**

CAR OR TRUCK WINDOW DEFROSTER. Designed for use on gov't. trucks, jeeps, etc. Excellent for passenger cars, commercial vehicles, in stormy weather. Easily removed and stored away when not needed. Operates from electric 6V. DC (use two defrosters—in series—for 12V. DC systems, one can be installed on rear window) and each set is complete with switches, fuse holder, and necessary wire. Defroster has 4 resistance wires running inside glass (8" x 16") to produce heat for defrosting window. Defroster is held to window by 4 suction cups. NEW, UNUSED condition, each packed in metal case. Shpg. wt. 7 lbs.
EACH **$6.95**

All Above Material Subject to Prior Sale. 25% Minimum Deposit with All C.O.D.'s. Min. Order—$5.00.

All Prices F.O.B. Our Address.

WE BUY PRC, GRC, R-390 OR 391, SP-600, ETC. WE WILL PAY TOP DOLLARS FOR GOOD CONDITION EQPT.

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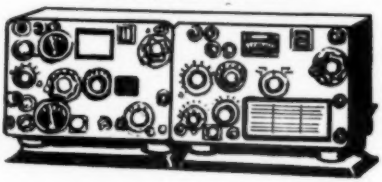
142 West B'WAY, NEW YORK 13, N. Y.
PHONE: COrtland 7-5444

SENSATIONAL BARGAIN!! TCS TRANSMITTERS, RECEIVERS, AND ACCESSORIES



TCS TRANSMITTER. Famous work-horse of the Navy, rugged, efficient reliable. Delivers 20 watts phone, 40 watts CW in 1500KC to 12.0 MC range. Incorporates VFO or 4-crystal controlled channels. Excellent for mobile or fixed station use. Complete with tubes, Used-Very Clean condition. Shpg. wt. 60 lbs. All Accessories extra.
EACH, not tested at this low price **$39.95**

TCS RECEIVER, companion to above, 1.5 to 12.0 MC in 3-bands. Continuous tuning of 4 fixed crystal controlled frequencies selection. Employs a stage of RF amplification and 2 stages of IF to provide good sensitivity and selectivity. Requires separate Power Supply. Excellent for Hams, CD, MARS, etc. Shpg. wt. 50 lbs. USED—EXCELLENT Condition.
PRICE EACH, not tested at this low price, with tubes **$49.95**

TCS 12 VOLT DC POWER SUPPLY, to operate above units from 12 V. DC. Contains 2 Dynamotors, one for transmitter and one for receiver supply, complete filtering, starting relay, etc. **NEW UNITS.** Shpg. wt. 40 lbs. **PRICE EACH $17.95**

TCS REMOTE CONTROL UNIT with built-in loudspeaker, volume control, microphone and phone jacks. Shpg. wt. 10 lbs.
NEW UNITS, EACH **$9.95**
As Above, but "Used—Very Good" **$6.95**
Plug Connector for Remote Control **$1.50**

TCS CONNECTOR CABLE. Transmitter or Receiver to Power Supply. Shielded. (Specify which). 3 foot length $5.95; 11 foot length wt. 5 lbs. **$8.95.**

TCS ANTENNA LOADING COIL, permits use of short, whip type antennas on lower frequencies. Shpg. wt. 8 lbs. "Used—Good."
EACH **$6.95**

30-40 MC DE-LUXE FM RECEIVER. Model R-237/VRC—2 Single-Channel, Double-Conversion Superhet, with features such as double limiter, squelch circuit, crystal-control of both 1st and 2nd Converter Oscillators, built-in 6 V DC Power Supply, etc. Dimensions 11½" x 10" x 15". Used—Excellent condition units, with tubes, less crystals or control unit or loudspeaker, with schematic diagrams. **$29.95**
Shpg. wt. 65 lbs. **EACH** .....

TRANSMITTER COMPANION TO ABOVE. Model T-193/VRC—2. Power Output 25 watts. Crystal-controlled single-channel unit with built-in 6 V DC Power Supply. Can be used for NB FM amateur transmissions, or may be applicable to Fire, Police, or other applications. Used—Excellent condition units. With schematic. Shipping weight 65 lbs. **EACH** **$19.95**

BC-1306 TRANSMITTER-RECEIVER for MARS application. 3800 to 6500 KC. MO or Crystal Control. Includes Crystal Calibration and Net Controls. NEW UNITS, with all tubes except Final RF 2E22 tube. Shpg. wt. 50 lbs. **$22.50**
EACH

PE-237 POWER SUPPLY, for Above BC-1306. Supplies all necessary voltages and current for both transmitter and receiver sections. Operates from 6, 12, or 24 Volts DC. **$14.95**
NEW—UNUSED units. Shpg. wt. 125 lbs. **EACH**

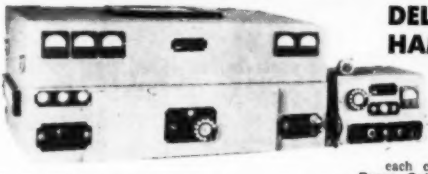
MINIATURE STORAGE "A" & "B" BATTERIES. For Walkie-Talkies, Radio Portables, Radio-Controlled devices, Radio-Sondes, or equivalent meteorological devices. Supplied as a set of 3—"B" batteries of 36 volts each, and 1—"A" battery of 6 volts. Batteries dry-charged, less electrolyte and packed in a hermetically sealed vacuum metal container which prevents possibility of deterioration or loss of efficiency until opened and ready for use. Both "A" battery (BB-51) and "B" battery (BB-52) are ⅝" deep x 1½" high x 3¼" long, with 2 connection pins of ½" length protruding from each battery. Hypodermic needle required for acid—water filling 1280-1350 specific gravity. Full instructions supplied with each set of batteries for filling and charging. NEW-UNUSED, shipping weight 4 lbs. **PER SET** of 4 batteries as described. **$3.95**

BRITISH-TYPE INFRA-RED IMAGE (SNOOPERSCOPE) TUBES. Used in British "Tabby" for seeing in the dark for "snooper" or "sniperscopes." Will detect objects at night illuminated by "dark" infra-red rays. Requires power supply of 2000 to 4000 volts at a few microamperes. Screen size is 1⅝" dia. All tubes checked before shipment. **Price 3 for $10**

FRONT END LENS ASSEMBLY. For above. Speed, F1.9 f. 1. 91.44 mm. Outside dia. at one end 60 mm. Length of mount 64 mm. ..... **Each $7.00**

PLEASE!! DO NOT REQUEST CATALOGUES! MATERIAL LISTED IS "HERE TODAY, GONE TOMORROW," AND CATALOGUES WOULD BE USELESS.

SUMMER CLEARANCE BARGAINS —



DELUXE TRANSMITTER FOR HAM OR COMMERCIAL USE AT REAL LOW PRICE!

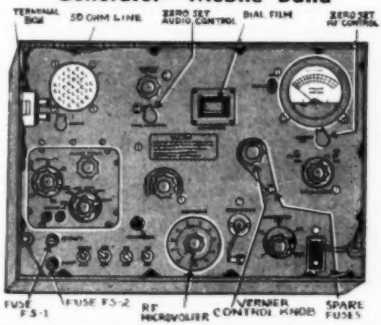
This unit (BC-1100, part of RC-263) is exceptionally well-built and finely engineered with versatile features that make it a splendid transmitter for Ham or Commercial use. Frequency coverage is 1.5 to 10.0 mc; 4-channels of either crystal or VFO control are provided, each channel covering the entire 1.5 to 10.0 mc range; **Power Output** is conservatively rated at 50 W. Phone and 75 W. CW, but actual output is 25% more; **Operation** is from any power source **100 to 260 V. AC, 25 to 60 cycles; Automatic Dialing** controls power "on" or "off," channel selection, phone or cw, etc.; **REMOTE CONTROL** (RM-40) with Automatic Dial permits complete control of all aforementioned operations (transmitter can be in cellar, attic, garage, or any remote point up to 11 miles distance) over 2 pairs of wire, and includes a microphone amplifier and line level indicating meter. Transmitter circuit employs a 6L6 as crystal or VFO Oscillator, a 6L6 as Buffer-Doubler, and 3 807 tubes in RF Power Stage; modulator section has a 6J5 speech amplifier stage and 4-6L6 tubes in power stage. Power Supply section uses a 5Z3 low-voltage rectifier, 2-RK60's as high-voltage rectifier. Remote control uses a 6J5 speech amplifier and an 80 rectifier. Additional feature is Pi-Network in Antenna circuit to reduce harmonic radiation and interference.

PRICE, BC-1100 TRANSMITTER, NEW-UNUSED, With all tubes, Instruction Book, Microphone, export packed. Shpg. wt. total (cases) 600 lbs. **$239.50**

RM-40 REMOTE CONTROL, for above. **Shpg. wt. 75 lbs.** $69.50

Case of Spare Parts, includes all meters for transmitter and Remote Control, all relays, complete set of tubes, spare microphone, capacitors, resistors, etc. **Shpg. wt. 70 lbs.** $99.50

HI-PRECISION FM SIGNAL Generator—Mobile Band



Model I-208, is a precision instrument worthy of the finest lab, mobile service and installation shop, or for production testing of mobile FM equipment. Previously, it was a scarce and expensive instrument, until we made a fortunate "buy" in a limited quantity. Freq. Range in 2 bands, 1.9 to 4.5 mc (for IF alignment and tests) and 19 to 45 mc. Freq. of output of signal is maintained within .03% of dial calibration over a temperature range from 0 to 60 degrees. Other outstanding features are: *Variable Frequency Deviation, 0-5 KC on 1.9 to 4.5 mc band, 0-50 KC each side of resting frequency on 19 to 45 mc band. *Calibrated Microvolter-Attenuator, adjustable up to 100,000 microvolts, developed at the termination of a 30-ohm line. Up to .84 volt available at high output terminals. *RF Vacuum Tube Voltmeter incorporated, 5 modulation frequencies provided by internal audio oscillator, 150, 400, 1,000, 2,500, and 5,000 cps. External modulation also provided for. *Operates from either 110 volts, 60 cycles AC, or 12 volts DC which is ideal for in the field work. *Crystal Calibrator, whose output is 1 mc and harmonics for checking and maintaining accuracy of signal generator. Each I-208 is supplied complete with tubes, calibrator crystal, 12V. DC Dynamotor and 110V. AC power supply are self-contained. Instruction Sheets and Schematic Diagram. Shpg. wt. is 145 lbs. (in wooden case). Available in NEW-Unused (tested) or Used-Excellent (not tested) condition. Act fast, our limited supply won't last long!

USED, EXCELLENT ..... **EACH.. $69.95**

COMMUNICATION ANTENNA BARGAINS!!

PREMAX TELESCOPIC VERTICAL ANTENNA, Chromed Monel Metal, 3 telescoping sections with watertight collet-type chucks to lock each section at desired length. Extends from 6 ft. 9 inches to a maximum of 19 ft. Excellent for Marine, Ham, CB, or Base short-wave operation. NEW-UNUSED units. Shpg. wt. 12 lbs. Originally price at over $90.00. Our **PRICE, ONLY** $14.45

30 MC MOTOROLA COAXIAL ANTENNA. Heavy duty, high-power construction. Easily modified by reducing length of upper whip section for higher frequencies, or increasing length by a few inches for CB application. Present length of top radiator 102". Equipped with female receptacle for PL-259 coax connector and 50 ohm line. Important mounting hardware included. UNUSED Units. Shpg. wt. 130 lbs. **PRICE, EACH** $14.95

POGO STICK WALKY-TALKY

Sensational HI-Efficiency Walk-Talky, known as BC-745 (Trans-Receiver) part of SCR-511 used widely by CAP. Excellent for emergency communications (especially for small boats on the "Safety & Calling" frequency of 2182 Kc) scouting, liaison, patrol contact, etc. Freq. range 3.0 to 6.0 mc. easily raised or lowered by removing or adding turns to Ant. & Osc. coils in plug-in tuning units. Power Output 0.75 Watt. Crystal Control of both transmitter and receiver. Plug-in Tuning Units (BC-746) with crystals employed for frequency changing. Uses 6 miniature tubes in modern superhet receiving circuit, and 4 miniature 3S4 Power tubes in transmitter. Modulation is 100% Plate type. Telescopic rod antenna turns power "on" or "off" when extended or collapsed.

The BC-745 Transmitter-Receiver may be used with Chest Unit T139, which houses the necessary dry batteries consisting of a 1½ V. "A" battery and two 67.5 V. "B" batteries and speaker microphone unit. Or, it may be used with the PE-157 Power Supply, which supplies all necessary A & B voltages from an internal 2 volt storage battery. This power supply has a built-in loudspeaker, but provides for separate headphones and microphone.

PRICE, EACH BC-745 POGO-STICK TRANS-RECEIVER, with tubes, connecting cord CD-571, and 1 BC-746 Tuning Unit USED, GOOD CONDITION. Shpg. wt. 15 lbs. **EACH** **$29.50**

SAME AS ABOVE, NEW CONDITION—EACH $42.50

CHEST-UNIT T-39, Excellent Condition. Shpg. wt. 5 lbs. **EACH** $15.00

POWER SUPPLY PE-157, less 2 Volt Storage Battery. Excellent Condition. Shpg. wt. 15 lbs. **EACH** $19.50

ADDITIONAL BC-746 TUNING UNITS, with crystals. Specify preferred frequencies. NEW. **EACH** $2.50

SPARE TRANS-RECEIVER CHASSIS, NEW, less tubes. Shpg. wt. 8 lbs. **EACH** $10.95

FM MOBILE BARGAINS, FOR SPECIALISTS

GE MOBILE FM, 152-172 **MC,** Model ES-12. 25 Watts Output. Combination Transmitter Receiver, with built-in rugged 12.0 Volt DC Power Supply. Double conversion Superhet Receiver circuit, ideal for FM monitoring of hi-band FM transmissions. Used-Excellent condition, with all tubes, but less accessories. Shpg. wt. 50 lbs. **PRICE, ONLY** **$49.50**

COMCO FM, 152-172 MC MOBILE UNIT. Transmitter-Receiver and 6.0 Volt Power Supply in one housing. Single channel, crystal-controlled. Excellent for conversion to 110V. AC operation, for monitor application. Used-Very Good condition, with all tubes, but less accessories. Shpg. wt. 50 lbs. **PRICE, ONLY** $37.50

PHILCO 30-40 MC FM MOBILE TRANSMITTER. Model PRT-336T. Single-channel, crystal-controlled, with built-in 6.0 Volt Dynamotor Power Supply output of which is 600 volts at 175 ma. Excellent for conversion for Ham, CB, Emergency application and others. Used-Good condition, with tubes, but less accessories. **BARGAIN PRICE, ONLY** $19.50

PHILCO 30-40 MC FM RECEIVER, Model PRT-336. Single-channel crystal-controlled. Easily changed to 110V. AC operation, and will make an excellent, inexpensive monitor of Low-Band FM transmissions. Used-Good condition units, with tubes but less accessories. Shpg. wt. 35 lbs. **PRICE, ONLY** $22.50

All Above Material Subject to Prior Sale. 25% Minimum Deposit with All C.O.D.'s. Min. Order—$5.00. All Prices F.O.B. Our Address.

WE BUY PRC, GRC, R-390 OR 391, SP-600, ETC. WE WILL PAY TOP DOLLARS FOR GOOD CONDITION EQPT.

— TELEMARINE —
COMMUNICATIONS

142 West B'WAY, NEW YORK 13, N. Y.
PHONE: COrtland 7-5444

Meshna's

MODEL 14 TELETYPEWRITER, includes typing keyboard, printer, cover. Sold "as is," some pull-bars may be broken. Otherwise in fair condition. $32.00

We still have some 11/16 punching tape, 40 rolls per carton. Two cartons make 100 lbs. . . . save on shipping, per carton. $3.00

NAVY ARB RECEIVER 195kc—9.05 mc. Covers 40-75-80-160 meters. Xtnt with all tubes. $32.00

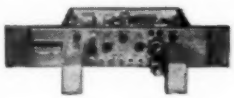
80 METER ARC-5 (3-4 mc) transmitter, xtnt ..... $ 8.50
BC-458 (5.3-7 mc) transmitter, xtnt ..... $ 8.50
ARC-5 MODULATOR MD-7, brand new ..... $ 8.50
17 FT. BALLOON, double plastic, wgt 26 lbs, aluminized ..... $ 4.50
RA-62, AC Supply for SCR-522, xtnt $35.00
28 volt DC supply 4 amps from 115 volt 60 cycle, unused $15.00
MAGNETICALLY REGULATED SUPPLY, brand new. Output 150 DC 3.4 amps plus 300 volts 3.2 amps. Wgt. 100 lbs., 2 rack panels $50.00
PHILCO TRANSISTORS, HF OSC/CONV similar to SB-100 ..... 80c ea., 3/$2.00
1,000 KC CRYSTALS, HC-6 holder ..... $ 2.25
TRANSISTORS, 15 pieces PNP low voltage, OK ..... 15/$1.25
NATIONAL TRANS. COND. TMK-150, 150-10, 5, unused ..... $ 1.50
220 MC DIPOLE ANTENNA, Brand New w/coax socket $ 3.00
TECH. MANUALS, fresh as new: any one at $2.50 BC-603, BC-659, BC-683, BC-1,000, ARN-6, ARC-27. Take your choice.
CRYSTALS, HC-6 metal holder. Your choice $1.00 each 37.85, 38.85, 39.85, 40.85, 41.85, 42.85, 45.85, 46.85, 47.85, 48.85, 49.85, 50.85, 51.85, 52.85, 53.85, 23.635, 24.544, 25.635, 26.259 mc.
"LM" POWER TRANSFORMER, original issue, 115 volt 60 cycle in. ..... $ 1.75
IBM WIRED MEMORY PLANE, 4096 bit. ..... $ 12.50
IBM MEMORY DRUM ..... $ 50.00

TRC-8 RECEIVER, 230-250 mc, easily modified for 220 or 2 meters. Written up in "CQ" May-June 1960. Built in squelch, speaker, 115 volt 60 cycle power supply. Ours like brand new in desk-type trunk. Schematic included. Wgt. 100 lbs. $35.00

NICKEL CADMIUM BATTERY, the lifetime battery 1.2 volts 4 amp hr. charge & discharge indefinitely. No known life termination. Xtnt charged, ready for use. $2.00

REMOTE CONTROL, brand new, consists of tel. dial, selsyn indicators, switches, pots, lights, housed in gray aluminum case. Gov't cost $150.00. Experimenters delight. Wgt. 29 lbs. $6.00

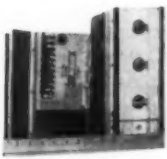
BC-788 RADIO RECEIVER, converts to regular FM receiver, converts to 6 meter and 2 meter receiver. With all tubes, xtnt. $7.00



PHILCO LINE TERMINATION & signalling unit, standard rack mount, contains hybrid coil, relays (4) transformers (115 v 60 c), trans "P" pad, rec "T" pad, 3.5 kc osc sect, tubes, etc. Imp. 600 ohms. Good for fone patch, signalling on line, etc. Gov't cost $421.00 and brand new in gov't package. Shipping wgt. 35 lbs. Late style eqpmt. $12.50

DUAL MICRO-AMMETER (150 microamps), used for conversion to teletype freq. shift and tuning indicator. We include conv. sheet. Xtnt used ... $2.00 brand new cond. ... $2.75

SOLID STATE SUPPLIES



surplus from sophisticated equipment

Regular 115 volt 60 cycle input.
#1 Output 12 volt 12 amp, transistorized regulated $35.00
#2 Output 12 volt 8 amp, transistorized regulated 30.00
#3 Output 6 volt 8 amp, transistorized regulated 25.00
#4 Output 3 volt 5 amp 20.00

RECTIFIERS

Stud mount rectifiers, vary from .5-10 amp up to 600 PIV. You grade 'em. Bag of 8 silicon stud rectifiers. $1.00

NAVY RANGE FILTER (illustrated) for CW. Almost a lost item. Ours brand new boxed. .... #FL-5 $3.00

UNDERWATER MICROPHONE (HYDROPHONE) unused Navy Surplus, with 60 feet mike cable on spool. Mike approx. 2 inches. ..... #SSB $5.50

1N82 DIODES, UHF MIXER, good for gen. purpose. Short leads, snap-in style. #1N82 bag 25 $1.00

2N38 AUDIO FREQ. TRANSISTORS. #2N-38 bag 12 $1.00

POWER TRANSITORS, mixed, up to 40 watts #PT bag 5 $1.00

FREQUENCY METERS

LR, Navy Standard, made by Gen. Radio— 160kc-60 mc, ± .003. Xtl Calib. 100 kc xtl, ± 1 cps. Multivibrator Freq. 10-20-100 kc. Interpolation meter range 0.-5.5 kc. One only available. Shipping wgt 200 lb. Shipped from Miss. $175.00
BC-221-AK (modulated) Brand new condition, less supply $100.00

LAMBDA REGULATED POWER SUPPLIES, used, good shape.

C-481M	$100.00	C-881M	$100.00
33M	75.00	32M	75.00
35	75.00		

NOTE: If you've been a little annoyed at some slowness on our part we ask your forgiveness. The responsibility for this lies squarely on 73, for my wife and I have been unable to keep up with the unbelievable demand for catalogs and the mountain of orders. Yours will be along momentarily.
John Meshna

Items listed above are from factory termination. Some are military rejects, some marked, some unmarked due to factory closure. All sold on "happy or money back" guarantee.

Meshugenahs

COMPUTOR CIRCUIT BOARDS with various parts to be clipped consisting of resistors, transistors, pulse transformer, tube sockets, RF chokes, etc. Two boards for a buck with a guarantee count of at least 150 parts on them. Order this one by Stock #2B. Cheaper by the dozen. **$5.00**

IBM FERRITE TOROID CORES. Used in IBM memory planes. Normal list price of these cores at 50c each. Size .075 OD. A whopping bargain at 200 toroidal cores for $1.00. Item #TC **$1.00**

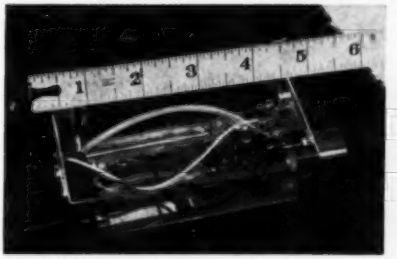
SET 80 CRYSTALS FT-241 holder. Complete set from 370.370-516.666 kc. Used in lattice filters, crystal standards, includes 500.000kc as well as 455.555kc. Cost Uncle Sam $250.00 the set. Yours for only **$5.50**

FILAMENT TRANSFORMER 12 volt CT 40 amps. Being center tapped you can use it for 6 or 12 volts. Regular 115 volt 60 cycle input. A real brute. Use a pair back-to-back and you have a nice isolation transformer. Used, OK. Wgt approx 15 lbs. Order #T-48 **$4.00 each.**

NAVY FL-5 CW FILTER. This is the one so widely written up for separating CW. Passes approx. 1,000 cycle tone. Unused with cord & plug. A rare item today. #FL-5 ..... **$3.00**

COPPER LAMINATED 1 SIDE PRINTED CIRCUIT BOARDS. Everybody uses these today. 8 boards, copper one side, approx 3x11 inches. ..... **8 for $1.00**

SELENIUM SOLAR CELLS in light, generate electricity. Experimenters package of 5 different sized cells with construction booklet for 13 different applications. Make a code oscillator, make a sun powered radio, etc. Lots of fun. #SOL-1 ..... **$1.50 set.**



27-54 mc CONVERTER. Crystal controlled, transistorized, small size, internal 9 volt powered. Feeds into broadcast radio, Car radio, etc. Tuning range any 1500 kc sector between 27-54 mc. Crystal supplied, you name the frequency you wish to tune. Fine business for CB, police and fire, or 6 meters. Ready to use. **$25.00**

RELAYS . . . we have them and this is your opportunity to buy them at a reasonable cost. Mostly SIGMA, some used, some removed from equipment. All guaranteed OK.

RY-101	4,000 ohm 10 amp contacts, NC ST	**$1.00**
RY-102	1,000 ohm 3 amp contacts DPDT	**1.00**
RY-103	2,900 ohm 1 amp contacts SPDT	**1.00**
RY-104	8,000 ohm 1 amp contact NC SP	**1.00**
RY-105	10,000 ohm SIGMA type 4F Sensitivity adjustment SPDT	**1.50**

SNOOPERSCOPE TUBE Image converter tube, the same as used in the late model M-3 Sniperscope. Unused in original boxes. Allows viewing in total darkness with proper optics and IR source. Spec sheet included showing optics and spacing. Gov't cost $125.00 each. You buy 'em for **$6.50**

HAM CRYSTALS in the popular FT-243 holder. Your choice at ..... **50c** each
7150 - 8350 - 8366.7 - 8400 - 8483 - 8550 –

5KV DC POWER SUPPLY, 115 volt 60 cycle input. 5 ma out. Ripple .8%. Packaged, sealed unit, size approx 6x4x6 inches. Unused. **$25.00**

5,000 VDC OIL FILLED PYRANOL, unused. .25 mfd 5,000 volt. ..... **$1.50 each**

Catalog #63 just off the press. 10c handling would be appreciated.
All material FOB Lynn, Mass.

JOHN MESHNA, Jr. *Surplus Electronic Material*

19 ALLERTON ST. Tel. LY 5-2275 LYNN, MASS.

COMMAND SET SPARES (AN/ARC-5)

TUBES:

12SK7 ..... $ .75
12K8 ..... $ .70
12SR7 ..... $ .75
12A6 ..... $ .50
12J5GT ..... $ .75
VR150-30 ..... $ .50
1625 ..... 3 for $1.00
1626 ..... 4 for $1.00
1629 ..... 4 for $1.00

TRANSFORMERS & CHOKES:

Rec. Output (5631) ..... $ .75
AF choke (5634) ..... $ .50
RF chokes (2092, 5546, & 7515) $ .30

CAPACITORS:

7715, 5415, 5414, 5413, 5418, 7210, 7582, 6350, 5416, & 5417 ..... $ .50 EA

OTHER RESISTORS AND CAPACITORS IN STOCK; INQUIRE.

TECHNICAL MANUALS

TM 11-5039	AM-65/GRC	$1.50
TM 11- 356	AN/FGC-1	$5.00
TM 11-5038	AN/GRA-6	$1.50
TM 11- 284	AN/GRC-3-8	$2.50
TM 11- 295	AN/GRR-5	$4.50
TM 11- 296	AN/PRC-6	$1.50
TM 11- 612	AN/PRC-8-10	$2.00
TM 5-9540	AN/PRS-3	$2.50
TM 11- 291	AN/VRC-13-15	$2.50
TM 11- 800	BC-191	$1.50
TM 11- 867	BC-787B	$2.00
TM 11-2513	I-193A	$1.50
TM 11- 920	PE-49C-G	$3.00
TM 11- 971	PE-162B	$2.50
TM 11-2137	TA-182/U	$3.50
TM 11-5024	TS-583A/U	$1.50
TM 11-2530	TS-308/U	$1.50
TM 11-2659	TS-303/G	$2.00
INST. BOOK	TS-505A/U	$5.00
TM 11-2237	TT-4/TG	$5.00
TM 11-5083	TV-7/U	$4.00
TM 11-5043	ZM-3/U	$4.50
12R5-1ARN6-2	AN/ARN-6	$3.50
ARC-27		$4.50

Large stock of plug-in resistors. Give ohmage and overall length.

Large stock of TCS spares, cables, mounts.

BC-348 mount (FT-154) .. $3.59 Del.
Plug for above (PL-103) . $1.59 Del.
Bud deluxe metal cabinet, 19". 12¼" panel space
CR-1742-G $11.50

DYNAMOTORS

12VDC input; 500VDC 250MA output. 12 lbs. ..... $ 6.75
12VDC input; 500VDC 200MA output. Carter ..... $11.50 EA DEL.
12VDC input; 220VDC 100MA output. shipping wt. 7 lbs. ..... $2.25 ea.
6VDC input; 600VDC 175MA output. $6.75

Contactor: 12VDC. SPST 50AMP contacts ..... $1.59 DEL.

Cramer Motor Driven Time Delay. operates on 115V 60CYC. 10 AMP. contacts. Set at 120 SEC. adjustable 0-120 seconds.
TD4-120S ..... PP-$9.50 ea.

1000MFD. 50VDC. electrolytic cap. w/clamp. ..... $ .50 ea.
UHF Coax straight adaptor, PL-258. connects two PL-259's together
$ .60 ea. 3 for $1.50

PLATE TRANSFORMERS

1460-0-1460VAC AT500MA. 115V 60CYC. Kenyon. 7¾ x 7¼ x 6⅝. $21.50 ea.—45 lbs.
UTC-S-46. 1000-750-0-750-1000VAC AT 300MA. 115V 60CYC.—$14.50—shipping weight 21 lbs.
500VCT at 106MA. PRI. 115/230V 60CYC. HS $3.39 Del.

FILAMENT TRANSFORMERS

UTC TYPE CG FILAMENT TRANSFORMER
Primary 105, 115, 210, 220, 230V. Secondary 5VCT AT 25A. INS. FOR 5KV working, 11KV test. 11 lbs.
CG-121 ..... $8.50 ea.

Combination Transformer. 16.6V. at 1.25A., AND 12.6V. AT 3.5A. Ideal for filament and 12 VDC., for relay power for mobile eqpt. 3⅛" x 3½" x 4⅛". Primary is 115/230V. 50/60 CYC.
672-0005-00 ..... PP $3.15 ea.

115/230V Pri. 60CYC. Sec. 5.0VCT 6A, 2500 VT. HS. 3⅛ x 3½ x 4¼, shipping wt. 6 lbs. ..... $2.25 ea.

117V 60CYC. Pri.; Sec: 5V at 2A, 2.5KVT & 6.3V at 3.3A 1.5KVT. HS. 1⅜ x 2⅜ x 4" shipping wt. 4 lbs. $2.25 ea.

Power Transformers: 115/220V 60 CYC. PRI. SEC. 580VCT 185MA., 6.3V at 5.5A, and 5V at 3A. Half-shell case. P/O SX-28. 3¾ x 4½ x 4¼ above chassis and 1½" below chassis. shipping wt. 14 lbs. ..... $3.95 ea.

CHOKES

4HY. 300MA. 2.5KVT 30 OHM DC RES. HS. 4 x 4⅜ x 5¼" shipping wt. 12 lbs. ..... $3.85 ea.
5HY. 230MA. 120 OHM DC RES. P/O TS-28. HS. 3 x 2¾ x 3¼" shipping wt. 4 lbs. ..... $1.25 ea.
4HY. 200MA. 192 OHM DC RES. 8KVT. "C" CORE, OPEN CONST. shipping wt. 3 lbs. ..... $1.25 ea.
3HY. 120MA. 115 OHM DC RES. 630 VW. HS. 2⅜ x 2⅜ x 3" shipping wt. 3 lbs. ..... $1.50 ea.

32HY. 40MA. 540 OHM DC RES. 300 VW. HS. 2⅝ x 2½ x 3¼" shipping wt. 3 lbs. ..... $1.50 ea.

100HY. 15MA. 1K OHM DC RES. 2KVT. HS. 2⅜ x 2¾ x 3¾", shipping wt. 4 lbs. ..... $2.00 ea.

.004HY. 5.4A. 0.15 OHM DC RES 535VW. HS. 2⅛ x 2½ x 3¾" shipping wt. 3 lbs. ..... $2.00 ea.

DUAL .05HY 500MA. 3VACW. 2⅞ x 3¼ x 3¾" shipping wt. 4 lbs. $ .48 ea.

Chicago Hermetically Sealed 8HY. 300MADC Filter Choke. 60 OHM DC RES., 3500VRMS test. 4.57 x 4.12 x 5.32H. NET WT. 12½ LBS.
RH-8300 8HY. 300MADC PP $7.47 ea.

Swinging Choke: 5-25HY. 200MA. 2.4KVT. POTTED. 3¼ x 3½ x 4¼" shipping wt. 8 lbs. ..... $2.50 ea.

All items are F.O.B. our store unless marked delivered. **ALL ITEMS ARE NEW.**

HIWAY COMPANY

SATISFACTION GUARANTEED

1147 VENICE BLVD., LOS ANGELES 15, CALIF. **DUnkirk 2-8383**

RTTY PARTS

POLAR RELAYS, TYPE-D164816, new in Ctn. Similar to but smaller and more flexible than the 255A. Has 3 windings. Can be used in plate circuit (write for free diagram) ..... $ 1.95
AMPHENOL 9-pin socket for above relay ..... .25
W.U. TYPE 41C TTY RELAY ..... .25
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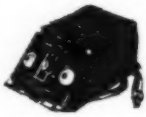

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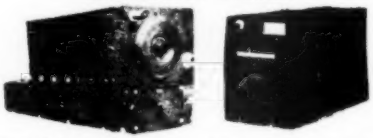

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OS/29 UPM4A Oscilloscope 60 cycle. Can be used as a panadaptor, 110 V.A.C. regulated selenium power supply. Pins 1 and 3 for 110 voltage. This is a real gem and one that you'll be proud to own. Excellent like new cond. **$59.95**

TS-239/UP Oscilloscope. (Lavoie Lab. LA-239-A) Portable Measuring instrument used in testing all types of electronic equipment, in radar and communication fields. This unit consists essentially of a calibrating voltage generator, a timing marker generator. Has self-contained power supply, 105-125V 210W, 50/1600 cyc. AC Sinewave response 10 cycles to 5 mc. Excellent Cond. **$99.50**

Stoddard Turret Attenuator Mo. #90519-42 2 position, 0 DB & 60 DB Imp. 50 OHMS New **$75.00**
H.P. 475B Tuneable Bolometer Mount Used Exc. Cond. A REAL VALUE AT **$99.50**

WE ARE TEST EQUIPMENT SPECIALISTS, AND INVITE YOU TO CHECK WITH US FOR ALL YOUR TEST EQUIPMENT NEEDS.

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T18/ARC-5 Xmtr, 2.1-3 mc BRAND NEW original sealed cartons **$9.95**

6146 Tubes, new Tested and Guaranteed ..... **$2.25 ea, 2/$4.00**

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PL 258 double female connector	$.59
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Sperti Vacuum Switches for ART-13, etc. NEW	$1.00
Velvet Verniers w/large knob NEW	$1.00
600 Ohm 300 Watt Non-inductive Resistors	$2.50
WE-255A Polar Relays for TTP	$4.50
Sockets for use with above relay NEW	$2.50
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Leach Relay #1351 110 vac spst	2.00
PL-259 or SO-239 coax conn	3/1.00

WE-416B Tubes Tested and Guaranteed **$12.95**

Nylon Box Kites used for sending up antennas from life boats—ideal for field day etc **$4.95**

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NEW SURPLUS TUBES GUARANTEED

2C39A	$7.50	5881	$1.50	6AN5	$1.25
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4-65A	$7.50	4X250F	$25.00	811A	$3.25
8005	$14.00	807	$1.00	GL6442	$20.00
4-250A	$21.00	6360	$3.50	5894	$17.50

We buy & sell large quantities of Military and Commercial Test Equipment. AN/GRC, PRC, TRC and test equipment TS and AN/UPM or URM. What have you for sale or trade?

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Tektronic 511A Scope as is	115.00	checked out L/N	215.00
TS-175A/U Freq Meter 85 to 1000 mc/s New			160.00
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AN/UPM-79 SW1 used with AN/SPS-5 radar New			35.00
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600 Ohms 300 watts	2.50
2500 Ohms 20 watts	.75
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OHMITE tap sw. #212-12	3.00
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ST-12C spst momentary	.20
ST-12D spdt	.35
ST-13D spdt	.40
ST-23N spdt	.45
ST-26K dpst	.45
ST-45E spdt on-off-on	.35
ST-45F spst mom	.35
ST-50K dpst	.50
ST-50M dpst	.65
ST-52N dpdt	.50
ST-55M dpst mom	.65
ST-55P dpdt on-off-on	.70
ST-55R dpdt mom	.75
ST-55S dpdt on-off-on mom	.80

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T5 125 V 60 Ma. & 6.3, 1A. 2x2x3	1.50
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BRAND NEW ONLY ARC-5 TRANSMITTERS

2.1-3 MC
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Your Choice BRAND NEW 9.95 ea

UHF Recvr—BC-733—w/dyn and 10 tubes. Converts to 6 or 2 Meters	5.95
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Navy LM, .125-20 mc w/matching book, xtl, schematic, instrus., 100% grtd **$57.50**

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SCR-522 recvr, xmtr, rack, case, exc. cond. 19 tubes include 832A's. 100-156 mc AM. Satisfaction grtd. Sold at less than tube surplus cost. Shpg wt 90 lbs fob Bremerton, Wash. **$14.95**

Add $3.00 for complete technical data group including original schematics, parts list, IF, xtl formulas, instruct. for AC pwr sply, for recvr contin. tuning, for xmtr 2-meter use & for putting xmtr on 6 & 10 meters. Add $7.50 for complete Handbook which includes AC sply RA-62.

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BC453B: 190-550 kc 6-tube superhet w/85 kc IF's, ideal as long-wave recvr, as tunable IF & as 2nd convert. W/all data. CHECKED ELECTRICALLY. Grtd. OK 9 lbs. fob Los Angeles **$12.95**

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R-45/ARR-7 brand new, 12-tube superhet .55-43 mc in 6 bands, S-meter, 455 kc IF's, xtl filter, 6 sel. positions, etc. Hot and complete. It can be made still better by double-converting into the BC-453 or QX-535. Pwr sply includes DC for the automatic tuning motor. Fob San Antonio **$179.50**

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R-54/APR-4 recvr is the 11-tube 30 mc IF etc. for the plug-in tuning units: has S-meter, 60 cy pwr sply. Pan., Video & Audio outputs. AM. Checked, aligned, with heads for 38-1000 mc, pwr plug & Handbook, fob Los Angeles **$164.00**

(Add $30.00 for 60 cy AM/FM instead of AM.)
(Write for price on Panadapters and for TN's to get to 4 kmc and recvr to 6 kmc.)

Panadapter Bargains: 400 kc input, 115 v 60 cy pwr supply built in, Navy RBV-1, exc **$49.50**

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60 CY AC FROM 12 V DC & VICE VERSA!

Charge 12 v battery from 115 v 60 cy then use the battery to make 115 v 60 cy sq wave for anything except capacitor-start motors. New, factory over-run, grtd 100% OK, original pack, w/inst. 250 W 2.8 amp intermit., 200 W 1.8 amp contin. 15 lbs net fob Los Angeles **$57.50**

500 W 4.0 amp intermit., 300 W 2.5 amp contin. Metered. Compartment for battery you use to make AC or to start dead cars; w/starter cables. 55 lbs. **$137.50**

Silicon Diodes Less Than a Dime! We send you 50 stud-mount and 50 top-hats ranging 50-600 PRV and 0.3-2 Amps. Unmarked, rejected for Mil Spec, but plenty are plenty OK for ordinary use. You do the grading w/instructions we furnish and if you don't get enough good ones out of the lot, we will send you more free or refund your money on return. Unconditionally grtd to give you enough good ones to delight you! Postpaid **$9.95**

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Ideal for labs, instrument checkouts, breadboard assemblies, etc. Eclipse-Pioneer #12142-1-A. In: 27½ v dc 22A. Out: 3 ph 115 v 400 cy 250 VA 1.0 PF. V & freq. regulated. Only 9¼" lg, 6¼" h. Very clean, checked, grtd, w/mating plug. 14 lbs fob San Diego, only **$9.95**

MIL SPEC SILICON DIODES 1N250A

Unused, contract termination. 200 PIV 20A at 150 deg. C. ¼-28 stud, hex base. Max 1½ v drop, 5 ma reverse, 250 A ½-cy surge. Regular $14.00. Buy postpaid at only **$3.50**

SuperPro Bargains: Pwr Sply RA-94 new $12.95

BC-794B, .125-40 mc, perfect, w/pwr sply $199.50

AMPLIFIER: GAIN 31,000. PASS 5½ MC

Has 8 6AK5's, overall gain 90 db at 60 mc w/pass 5½ mc 3 db down. No specified input; output to 600 ohms. Needs 6.3 vac & 120 vdc. Net wt. 2 lbs. 12"x4"x2½". W.E.Co. 60-69266 for Bu-Ord radar. NEW! fob Norfolk, Va., only **$14.95**

UNIDIRECTIONAL D.F. LOOP & PREAMPLIFIER

Navy DU-1. Compact; only 7 lbs total. 11" loop, 4½" azim. scale. 2-12SK7's tune 0.2 to 1.6 mc. W/instructions, modify to 3 mc. Takes B-plus from recvr you use it with. True bearing in 3 seconds, no 180-deg. ambiguity! New **$29.95**

160/80/75/40/20 METER XMTR, 50 W TO ANTENNA

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MEASURE R TO 0.1%, E AND I TO 0.01%

and with ZERO current drawn! Read 4 digits on 3-dial 20K ohm Kelvin-Varley Voltage Divider for direct-reading potentiometric measurements of E and I, AC and DC. Air Force Spec says 1 part in 10,000. Plus 0.1% standards to measure R in modified Wheatstone Bridge ckt. Plus 100-0-100 uA meter and ckt of 2-transistor amplifier for 3 uA full scale. You get a $1055.00 Air Force Test Set plus Handbook, R Standards, and our own simple instructions. BRAND NEW. Shpg wt 37 lbs fob Springfield, Ohio **$79.50**

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All modulated, all microvolt-calibrated outputs, all grtd 100% OK. Boonton #203B Univerter .1-25 mc, $130. #804/LX2. 7½-330 mc, $150. Meas. Corp. #78FM. 88-108 mc, $150. #80 or AN equivalent TS-497B/URR, 2-400 mc, $350. #80R, 25-475 mc, $400. LAE2 new, .52-1.3 kmc, $90. LP w/pwr sply, 9½ kc-50 mc, $250. TS-452 Wobbulated, with scope display of passed signal. 5-110 mc, $150.

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400 cy plus or minus .001%, AM. Time Prod. #2001-2, fork $9.95

Complete module, w/tubes, instructions $14.95

Same in case w/pwr sply, AF amplifier $69.50

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Philamon 400 cy plus or minus .05% w/tubes, instruct $9.95

Philamon 500 cy plus or minus .05% w/tubes, instruct $9.95

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Sorensen Q28-.5: 18-36 v plus or minus ½%, 500 ma. $ 99.50

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0.1% SORENSEN Line Voltage Regulator

#5000S regul. against load changes 0-5 kva & line changes 95-130 v, 1 ph 50/60 cy; adj. output 110-120 v, holds to 0.1%. Harm. less than 3%. Recovery .15 sec. Regularly $695.00 less spares. New, w/spares orig. pack. 285 lbs. fob Utica $349.00

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#1500 Special, 150 to 1500 va. 105-125 v 60 cy. plus or minus 0.3% line & load. 110-120 Vo. Max 5% distort. fob Norwalk, Conn. $199.50

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ISOLATION AND/OR STEP-UP/DOWN XFRMR

7½ KVA! G.E. #78G501. Primary 115/230 v 50/60 cy. sec. 105/115/125 v. Shielded. Assg. cost $230.00! Exc. condition, grtd OK. 300 lbs fob Oakland, Calif. **$89.50**

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Ask us for your needs: send stamped addressed envelope. Add 25c for chart explaining AN Nomenclature. Examples of available literature: 20-page book on 1-177, with diagram of MX-949/U socket adapter, & tube data compiled to March 1957, $5.00. RT-18/ARC-1 schem. & tune-up instr. $2.00.

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IF YOU BUILD, $7.95

FILTER CHOKE

Hermetically sealed, 6 henrys at 80 mils; DC resistance is 150Ω. Shipping weight 5 lbs. (81P928)

95¢

CABINET ENCLOSURE FOR 10-1/2" RACK PANEL

Here's a real buy for you. This one is sized for the standard 10-1/2" by 19" rack panel and it accomodates a 17" chassis depth. Finish is soft grey enamel and the unit is shipped to you knocked down. Two for just $14.95. This cabinet is mailable in two parcels. Shipping weight 21 pounds. (09P019)

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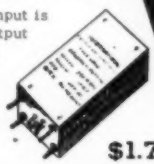
FULL WAVE BRIDGE RECTIFIER

Sealed in oil; input is 33 volts AC, output is 24 volts DC. It is rated 850 mils and will go lots more. Ship. Wt. 2 lbs. (56P001)



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600Ω characteristic input and output impedance, this has a center frequency of 1105 cycles. The bandwidth is 200 cycles down 20 db and 250 cycles down 40 db. It incorporates six toroids in L/C circuit. It is rock-solid stable and all in hermetically sealed case. Cut-away view is shown at the left. A real steal! Shipping weight is 4 pounds. (23P004)

$14.95

RANGE CALIBRATOR 'SCOPE UNIT

Here's just the thing to work on for your next 'scope project. Brand new and cost Uncle Sam close to $500. Warning - it's 400 cycle gear as it stands. Ship. weight is 60 pounds. (75P551)

MONEY BY NOT HAVING

SEALED RELAY - 110 VOLTS AC

DPDT, contacts rated 5 amps. Ship. Wt. 10 oz. (60P008)

VACUUM CAPACITOR

$1.95 Rated 100 Mmfd. at 20 KV, this one is made by the Jennings people. Shipping weight 2 lbs. (15P120)

$4.79

$2.89

CARBON MIKE FOR HIGH NOISE LEVEL

Noise cancelling type with response from 300 to 4000 cycles, 100Ω impedance microphone element. Complete with plug, and brand new of course. Ship. Wt. 18 ounces. (42P201)

79¢

COMPACT 6 VOLT FIL. XFMR.

With 115 volt primary, this little dickens uses only 3 square inches of valuable chassis space. Ship. weight 24 ounces. (81P308)

OUR BARGAIN BULLETIN.

MODULATES A HALF GALLON

15KΩ primary impedance, secondary is 5,700Ω. Primary is rated at 140 mils. Shipping weight 11 lbs.

DUAL LIGHTHOUSE SOCKET

$4.45 Made for a pair of 2C39s, this is a silver plated beauty. Shipping weight 3 pounds. (68P140)

$2.89

$7.95

DYNAMOTOR - 12 V.

These are rated from 400 to 440 volts DC at 200 to 220 mils with a continuous duty cycle. A beauty! Shipping weight is 11 pounds. (21P264)

IT'S FREE - WRITE FOR IT TODAY

REMEMBER - EVERYTHING ON THIS PAGE IS BRAND NEW AND IN NEW CONDITION. CAN YOU MISS?

ALL PRICES ARE FOB SACRAMENTO
MINIMUM ORDER $3.00 PLEASE

JOE PALMER

PO BOX 6188 CCC
SACRAMENTO CALIFORNIA

Columbia Gems!

TRANSISTOR TAPE RECORDERS

So low in price—so high in value! Importers' closeout! These units record, play back, and erase. Built-in speaker, single speed, volume control, etc. Comp. with mike, batteries and case.
Reg. $29.95 ..... **$9.95**
SAME AS ABOVE, but less case and mike. As is: **$3.95**

GARAGE DOOR TRANSMITTER-RECEIVER

This remote control radio actuates garage door motor (not supplied). Small compact transmitter mounts under car dash. 12 V. in Recv'r power input 115 V. 60 cyc. Original price was $69.50. Includes schematic. BRAND NEW!!! **$24.95**

TRANSMITTING TUBE SPECIALS!
All new, unused — guaranteed!

4-65A	$ 9.95	811	$ 3.95
4-125A	19.95	811A	5.95
4-400A	24.95	813	12.50
807W/5933	2.95	832	4.95

COLLINS ART-13 RADIO TRANSMITTER

2-18 Mc. 100 W. output. **This is the famous one!** Excellent condition.
A terrific buy at only **$49.95**
GOOD CONDITION **$39.95**

APN4-B LORAN SETS FOR MARINE USE
All excel. cond., checked out & Guaranteed!

ID-6B/APN-4: 5-inch indicator **$39.95**
R-9V/APN-4 4-channel recvr. Excel. cond. **29.95**
SET OF CONNECTORS AND MOUNTING RACKS FOR ABOVE **9.95**
MG-149F INVERTER: 24 V. in Excel. cond. **14.95**
COMPLETE PACKAGE OF ABOVE: SPECIAL **89.50**

R-65/APN-9 RECEIVER INDICATOR

Late model, 1-piece unit. Complete with plugs and mtg. rack. Exc. Checked out. **$69.50**
(Requires above MG-149F Inver.er.)

MINE DETECTOR SPECIALS

AN/PRS-3: Late 1950's model. Extra sensitive circuit. Like new. $49.95. Excel. cond. **$39 95**
TECHNICAL MANUAL for al ove **4.95**
SCR-625: World War II model. Known for its reliability New. FOB, New York, N. Y. Only **39.95**

COMMAND RECEIVERS
All Excellent Cond. & Terrific Buys!

1.5-3 Mc.			
New	$14.95	6-9 Mc.	$ 9.95
100-156 Mc.	22.95	190-550 Kc.	12.95

COMMAND TRANSMITTERS

2.1-3 Mc.		4-5.3 Mc.	
New	$6.95	New	$7.95
3-4 Mc.		5.3-7 Mc.	
Excel.	7.95	(Less tubes)	2.95

BC-348 RECEIVER

200-500 kc. & 1.5-18 Mc. in 6 bands.
Good ..... $ 99.50
Overhauled & like new 149.50

HEADSET & MIKE BARGAINS

HS-23 HEADSET: 4,000 ohms. New $ 4.95
HS-33 HEADSET: 600 ohms. Brand new ..... $ 5.95
T-17D CARBON MICROPHONE: Brand new ..... $ 9.95
RS-38 CARBON MIKE: With coil cord and PL-68 Plug. Brand new and bargain buy! ..... $ 9.95

RT-79/ARC-4 TRANSCEIVER

2 METERS 140-144 Mc. Can be used on 12 or 24 C. New **$29.95**
12 V. DYNAMOTOR for above: Excellent cond. **$14.95**

GONSET G-150 BUSINESS COMMUNICATOR TRANSCEIVER

Freq. 118-175 Mc. AM. Transmitter output 18 W. Crystal controlled on recv'r and xmtr. Models available: 12 VDC. Excellent for airports. Business band. Complete with mike, less crystal. Like new. Each only **$99.50**

FREQUENCY METER BARGAINS
Ex. Cond. Lab Tested!

TS-174/U: 20-250 Mc. Built-in modulator. Special **$169.50**
TS-175/U: 85-1000 Mc. Built-in modulator **169.50**
TS-323/UR: 20-450 Mc. Built-in modulator **239.50**

AN/VRC-2 30-40 MC FM EQUIPMENT

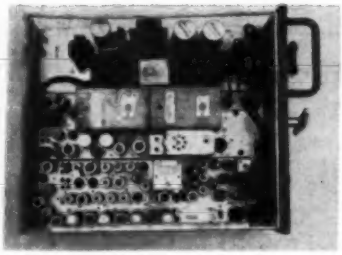
VRC-2 25W xmtr, 6V, exc. cond. $19.95
VRC-2 FM receiver, 6V, exc. cond. 24.95
VRC-2 Control Box, exc. cond. 4.95

WRITE FOR 48 PAGE COMPLETE CATALOG

Columbia Electronics

4365 West Pico Blvd., Los Angeles 19, Calif.

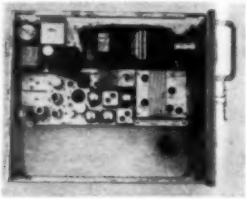
FM EQUIPMENT



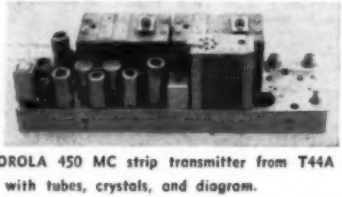
MOTOROLA T44A 6V. Transmitter has 2C39 final in cavity. Will tune to 432MC readily. Output is 15-18 watts. Final will take up to 80W input, put out 35-40 watts. Receiver is triple conversion superhet, 71MC hi IF, 8MC intermediate 455KC low IF. Power supply is 6V DC, 2C39 tubes included, a few small tubes and crystals may be missing. Schematics and 432MC conversion instructions included. Shipping Wgt. 65 lbs.
Catalog #10, Price $40.00
Catalog #11, 6&12 V. DC, Price $64.50
15" Case for above, Catalog #19 Price $2.50

MOTOROLA FMTRU-41V Front Mount
The transmitter is a 10W unit using a 2E26 in final. Receivers are unichannel receivers. Vibrator power supply converts to 12V readily. No cases available. Front panel included. Shipping wgt. 30 lbs. Catalog #22, 150 MC-6V
Price $44.50

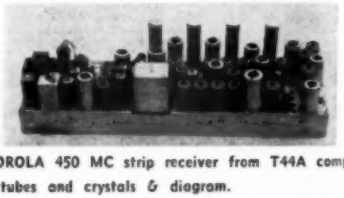
MOTOROLA
HANDIE-TALKIE
PORTABLES
Price: $15.00-$35.00 depending on condition. Request free catalog describing the units.



30 watt transmitter strip from 80D (2-2E26) with 6V dynamotor power supply. Shipping Wgt. 25 lbs.
Catalog #26, 30-50 MC
Price $15.00
Catalog #27, 150 MC Price $15.00



MOTOROLA 450 MC strip transmitter from T44A complete with tubes, crystals, and diagram.
Shipping Wgt. 13 lbs. Catalog #12 Price $25.00



MOTOROLA 450 MC strip receiver from T44A complete with tubes and crystals & diagram.
Shipping Wgt. 13 lbs. Catalog #13 Price $25.00

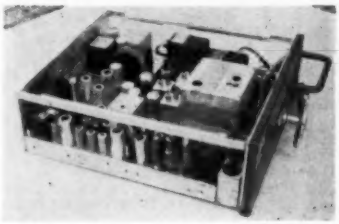
115V AC conversion kit to operate T44A on AC. Kit includes diagrams, instructions, transformer (6.5V-35A) plugs, rectifiers and all parts.
Shipping Wgt. 25 lbs. Catalog #14 PS-44 Price $15.00 Transformer only, $10.00

FM SURPLUS
1100 Tremont Street • Roxbury

MOTOROLA FMTRU-80D 150 MC
MOTOROLA FMTR-80D 30-50 MC

This unit has a 30 watt transmitter using 2-2E26 tubes. Dynamotor power supply. Receivers are double conversion super het. Receiver uses vibrator power supply. Shipping Wt. 46 lbs.

Catalog #15, 150MC-6V DC ..... Price $44.50
Catalog #16, 150MC-12V DC ..... Price $52.50
Catalog #17, 30-50MC-6V DC ..... Price $44.50
Catalog #18, 30-50MC-12V DC ..... Price $52.50
15" Case for above, Catalog #19 ..... Price $ 2.50

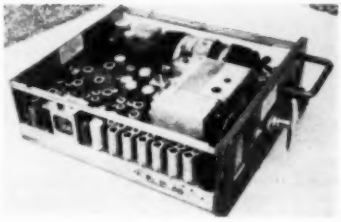


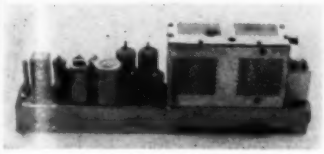
MOTOROLA FMTRU-140-D
MOTOROLA FMTR-140-D

This unit has a 60 watt transmitter using 829B in final. Vibrator P.S. for receiver and Dynamotor for Transmitter. Shipping Wgt. 50 lbs.

Catalog #20, 150 MC 6V ..... Price $54.50
Catalog #21, 30-50 MC 6V ..... Price $54.50
15" Case for above, Catalog #19 ..... Price $ 2.50

80D and 140D units have chassis cutouts for adding 2nd frequency oscillator deck to transmitter.





STRIP TRANSMITTERS

10 watt strip (2E26) from 41V. Shipping Wgt. 10 lbs.
Catalog #24, 30-50 MC ..... Price $10.00
Catalog #25, 150 MC ..... Price $10.00

PARTS

12V Power supply transformer for 80D and 30D receivers. #25C803512. Postpaid, $3.95 each
Motorola 144MC rooftop antenna complete with cable and connector. Postpaid, $5.95 each

BOOKS

Wide-Band FM for the Amateur by Aagaand and Dubois. Covers specific conversion of Motorola gear to 2 meters. 47 pages Price $1.75 postpaid

Motorola FM Equipment Schematic Digest. Contains a comprehensive collection of Motorola transmitters, receivers, power supply, and inter-connecting diagrams for Motorola FM equipment manufactured between 1949 and 1954. Covered is 30-50 MC, 150-170 MC and 450 MC equipment. Crystal formulas, crystal correlation data and basic alignment instructions are given. A Test set diagram is given for metering all Motorola gear. Typical readings for many transmitters are tabulated. A brief description is given for each generic type of Motorola chassis. Specific crystal data and complete alignment and 432 MC conversion instructions are given for Motorola T44A Series 450 MC equipment. 55 Pages Price $3.50 P.P.

All FM equipment is offered to licensed radio amateurs. Quantities are limited to two items to a customer. Each unit unless otherwise noted is a complete receiver, transmitter and power supply, a tube or two may be missing. Cases, cables, microphones, control heads and crystals are not available. Equipment is offered "as-is." Any purchase may be returned to us, freight prepaid, for a full refund if you are not satisfied.
All items subject to prior sale—Terms: Payment with order—Shipping: FOB Boston—Specify carrier. Prices subject to change without notice.

We sell Motorola equipment only. All equipment is used and subject to prior sale. Our stock in changing continuously.

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J. J. GLASS ELECTRONICS CO.

SPECIAL GONSET

GONSET AM COMMUNICATOR

(Fixed Freq.)

Special 18W COMMUNICATOR xtal-controlled on Transmit & Receive. Range 118 to 174 MC. IDEAL for Net Control, or fixed or mobile Net Stations & Repeaters! This compact transceiver, 8" x 12" x 5" (weight 18 lbs.) was designed for rugged commercial use. Covers 2 Meters and is easily adaptable to 6. 18 watts RF power input. Receiver & Tranmitter crystal controlled, range 118-174 MC. Receiver is double-conversion superhet. Available in 6 OR 12V or 110 Volts AC, specify which desired. Self-contained speaker. Push-to-talk hi-impedance mike. Built-in power supply.

NOTE: We have just designed a tunable two meter conversion diagram for the Gonset G-150 which will be included free with each purchase of this unit. These sets are also available complete with tubes and mikes completely checked. Not to be confused with similar, unchecked seconds recently offered for $99.50. **Our price $129.50 FOB Los Angeles, Calif. or will trade for GRC, PRC, or Test and Lab Equipment.**

Citizen Band Transceiver-BC 650 transceiver, 27 to 39 MC, 2 channel, crystal controlled easily converts to citizen band with required 3 watt output. Complete with tubes **$12.95**, less tubes **$6.95**

6 or 12 VDC power supply for above ..... **$8.95 ea.**

TRC-1 Transmitter—70 to 100 MC, FM, converts to 6 meter, complete with 60 cycle power supply. **$29.50 ea.**

RDZ Receiver-200 to 400 MC, Superhet, crystal controlled, autotune and with AC power supply. **$22.50 ea.**

TECH MANUELS

Tube Chart for I-177	**$1.00 ea.**
BC-1000	3.00
BC-1335	2.50
RT-67, 68, 70	5.00
SCR-511 (Horsie talkie)	2.00
BC-603 & 604	$3.00
BC-611 (Walkie Talkie)	2.00
BC-312, 342	3.00

MINIMUM ORDER $5.00

SPECIAL

Sub Miniature tube assortment—consists of 6 high priced, late type sub miniature walkie talkie and missile tubes such as 6021, 5829, 5636, etc. These tubes have been removed from new equipment. 6 assorted $1.00 (Do not specify)

ANTENNAS

MP-22 Mast Base—side mount, swivel mast base, will tip to 90 degree angle, good for MP-51 and up sections. New, boxed. ..... **$1.25 ea.**

Antenna output Assembly—A-85, 3-lamp assembly for indicating output of transmitter ..... **97c ea.**

Trombone Antenna, telescopes like trombone, for use on 2 and 6 meters. New, boxed. ..... **$1.25 ea.**

AM-104 Antenna complete with coax fitting, 100-156 MC ..... **$1.49 ea.**

Mast Section—MS-49 to 54 ..... **$.89 ea.**

MP-37 Mast Base—new ..... **$2.49 ea.**

Antenna Rotator Indicator—Consists of I-81 Indicator with built in Autosyn and selsyn generator, these 2 items used with a 12 volt transformer. Makes ideal azimuth indicator for antenna ..... **$4.95 set less trans.**

SPECIAL

717A Door Knob Tubes, same as 6SK7, for audio and hi frequency use, new, boxed. . .5 for **$1.00** or **20 for $2.95**

CAPACITORS

BIG SPECIAL

2 MFD—7500 V. capacitor 13 x 14 x 4 with two 4" insulators. Mfd. by Cornell Dubilier. New condition ..... **$14.95 ea.**

Light House Tube SPECIAL

2C46	**$1.75 ea.**
2C42	1.49

(good for APX-6)

X Band Klystron 723AB good condition. ..... **$2.95 ea.**

SPECIAL, TUBE KIT—considering of 2-6L6G, 2-6SN7, & 4-6AC7 plus 4 incandescent light bulbs, brand new, handy to have around the shack. ..... **$3.95 per kit**

J. J. GLASS ELECTRONICS CO.

AUDIO

Hi Fi Headsets—uses high grade tiny PM speakers to produce the finest musical quality, consists of 2—Hi Fi 300 ohm ear phones, 1—new headband and 2—chamois ear pads, used, excellent condition. ..... **$4.95 per set**

TCS Remote Speaker—manufactured by Jensen, built in transformer for low impedance headset. Mounted in a compact crackle finish case. Comes complete with volume control, bridged T pad and switches for remote use, excellent cond. ..... **$4.95 ea.**

TS-9 Handset—butterfly press to talk switch ... **$2.95 ea.**

T-17 Mike—good, used **$3.49**

T-45 Lip Mike—used **$1.49**

T-26 Chest Set—with sensitive carbon mike, new **$1.25**

Impedance matching transformer, hi to low ..... **$.50 ea.**

TS-13 handset ..... **$3.95 ea.**

Mike and stand old style telephone ..... **$1.25 ea.**

Dial Telephone ..... **$3.95 ea.**

Telephone less dial ..... **$2.95 ea.**

Cradle stand only ..... **$1.49 ea.**

F-1 carbon button ..... **75c ea.**

F-1 carbon button, late type—new ..... **97c ea.**

EE-8 Field Telephone ..... **$9.95 ea.**

Tiny PM Speaker, 1½ in. diameter ..... **$1.49 ea.**

SPECIAL

Hoffman TV remote Control—consists of 8 push button channel selector, motor drive and remote speaker, brand new ..... **$6.95 ea.**

Hoffman Stereo remote Balance—for remote cotnrol balancing of 2 remote speakers complete with 25 ft. 3 wire cable, new ..... **$1.95 ea.**

Similar unit but with single control, new ..... **$1.29 ea.**

Hoffman remote Control—designed for remote tuning and volume control, consists of motor, 25 ft. cable and control unit. (Can also be used for rotating antennas or where remote rotation and control of devices is required new, boxed.) ..... **$3.50 ea.**

SPECIAL

RM-52 Phone Patch ..... **$1.49 ea.**

RM-53 Phone Patch—more elaborate unit has cords and relay. ..... **$2.49 ea.**

Telephone dial ..... **$1.25 ea.**

Speaker, outdoor, Navy Type—12 in. diameter, heavy duty, used on board ship, good for patios, swimming pool, new, boxed. ..... **$10.95 ea.**

HS-30 small magnetic ear phones ..... **79c pr.**

T-30 throat mikes ..... **35c ea. or 3 for $1.00**

TRANSFORMERS

Hammerlund Super Pro power transformer new **$2.95 ea.**

Low Voltage Transformer—primary 115 VAC, secondary 38 VCT 5Amp and 2½ volts center tap 20 amp, new ..... **$3.49 ea.**

Low Voltage, High Current transformer—8½ volts 54 amps, 7½ volts 48 amps, 7½ volts 32 amps new. **$9.95 ea.**

Ouncer Xfmr—primary impedance 20K ohms, secondary 600 ohms for single sideband unit as described in QST March 1956 ..... **49c ea. or 3 for $1.25**

8 Henry 500 MA 50 ohm DC resistance, 4500 volts Max. WV price for choke ..... **$3.95 ea.**

12 Henry 250 Ma 250 Ohms ..... **$1.25 ea.**

Swinging Choke 12 Henry 75 MA new ..... **$.97 ea.**

MISC.

Modulation Transformer—Collins 20 watt 200 to 5000 primary Z6000, secondary Z6000 ..... **$.97 ea.**

Multiple tap scope transformer 110VAC primary includes 100 V., 2 ea. 375 V., 2 ea. 6 volts and 1 ea. 2½ V. New ..... **$1.49 ea.**

Isolation Transformer—110 V. to 110 V. 2 amps new. ..... **$3.49 ea.**

High Voltage Transformer—10,000 V. at 25 MA **$2.49 ea.**

Tachometer Generator—up to 4000 RPM ..... **$2.95 ea.**

Voltage Regulator—150 V. input 104 to 126 V. out at 26 Amps ..... **$12.95 ea.**

SPECIAL

RECTIFIERS, GERMANIUM—mounted in heat sink plate 200 V 5 amp per plate 4 plates to a stack. Can be assembled to higher current lower voltage. **$1.95 per plate**

Alignment Indicator—I-210, vacuum tube voltage indicator that shows resistance and continuity. Used **$1.95** cator that shows resistance and continuity. Used **$1.95** and new ..... **$2.95 ea.**

2 Volt Storage Battery—BB 54—rechargeable wet battery 2 volts at 20 amps new ..... **$2.49 ea.**

Sound powered handset ..... **$9.95 ea.**

3 Volt Power Supply—output 58 volts and 300 volts for geiger counter and strobolite. New ..... **$3.95 ea.**

6 volt 400 cycle chopper ..... **$.97 ea.**

APN-4 5" indicator ..... **$8.95 ea.**

BC-342 Receiver—AC power up to 18 MC ..... **$69.50 ea.**

BC-611 Walkie Talkies ..... **$49.50 ea.**

3" Scope Shield—Mumetal new ..... **$1.49 ea.**

10,000 ohm miniature relay, SPDT ..... **$1.95 ea.**

TG-10 Code practice set ..... **$19.95 ea.**

Noise and Gate Generator—TS-345 ..... **$22.50 ea.**

I-222 Signal Generator—covers 8 to 15 MC and 45 to 77 MC excellent cond. ..... **$24.95 ea.**

WE BUY OR TRADE GRC, PRC LAB AND TEST EQUIPMENT.

25% DEPOSIT REQUIRED ON ALL ORDERS

ALL PRICES FOB LOS ANGELES, CALIF. AND SUBJECT TO CHANGE WITHOUT NOTICE. ALL ITEMS SUBJECT TO PRIOR SALE

MINIMUM ORDER $5.00

1624 SOUTH MAIN STREET
LOS ANGELES 15, CALIFORNIA
TELEPHONES: PRospect 1179-1170

J. J. GLASS ELECTRONICS CO.

CRYSTALS

54th harmonic crystals in FT-241 holder ranging from 370.370 KC to 516.667 KC in 1.852 KC steps.

72nd harmonic crystals in FT-241 holder ranging from 375.000 KC to 540.277 KC in 1.388 KC steps. **49c each** or **3 for $1.25.**

Special purpose crystals in sealed metal containers, ½" spacing:

1000 KC	$4.95	13,000 KC	$1.95
100 KC	4.95	200 KC	1.95
9000 KC	1.95	30 MC	2.50
10,000 KC	2.50		

Sealed metal crystals in third overtone, fractions omitted. Will ship to closest fraction requested:

44 MC; 45 M; 46 MC; 47 MC; 48 MC; 49 MC

METERS

3" round 0-800 VDC in moisture proof, sealed metal case **$2.49**

2" round 0-300 VDC in moisture proof, sealed metal case **1.95**

3" square 300 VAC with built in light, Tripplett, new, boxed **3.49**

Semi Precision Volt Meter range 0-3-15-150 VDC plus 0-3-15-30 Amps DC with mirror scale, new ... **9.95**

15 MA meter, basic movement, 3" luminous dial, new ..... **1.95 ea.**

SPECIAL

Variacs, 3 Amp, 60 cycle up to 135 VAC ..... **$9.95 ea.**
Variacs, 110 V 10 amps 400 cycle ..... **$3.95 ea.**
Variacs, 20 amp 60 cycle 110 V imput ..... **$37.50 ea.**

COMMAND RECEIVERS

3 to 6 MC with automatic or manual tuning **$9.95**
6 to 9 MC **9.95**
12 VDC dynamotor for above **4.94**
All above equipment in used, excellent condition.

MINIMUM ORDER $5.00

TEST EQUIPMENT

TS-488 Test Set, X-Band Radar Test Set to find frequency spectrum of around 10,000 MC. Excellent condition. ..... **$34.50 each**

Intervolometer Tester, can be used for testing camera shutters or flash synchronization of equipment. Good condition. **27.50**

TS-170 Oscillator, used to check receiver sensitivity and audio channels 332 to 338 MC, can be converted for other uses, new, only **9.95**

TS-13 Signal Generator with self contained wave meter and power monitor for X-Band use, contains 723AB oscillator with pulser. Laboratory unit, sold for over $600.00 4 years ago, excellent condition, our price **75.00**

TS-102 Range Calibrator. This is a crystal controlled pulse generator. Produces square top pulse of 8 micro seconds. Ideal for experimentation. Good cond. **9.95**

Sextants, bauble type, featuring automatic averaging readings with carrying case, used, good condition. ..... **8.95 each**

SPECIAL

APS-13 transceiver for 420 MC ham band, less tubes and parts not needed for ham use. ..... **$1.95 ea.**
ARC-5 VHF Transmitter 100-156 MC, good for 2 meter use. New, complete with all tubes which includes 2-832A, only **$14.95**

LAST MINUTE SPECIAL

50 MMF 32 KV Jennings Vacuum Capacitor, new **$3.50 ea.**
Oscillating SPDT Coax Switch, to switch from one antenna to another by rotary action ..... **$1.95 ea.**
Polar Relays, Western Electric—for Teletype and Telephone Application, new ..... **$3.95 ea.**
Automatic Keyer, ARA-26 Keyer, can be used to key transmitter ..... **$3.95 ea.**
PRS-3 MINE DETECTOR, late type ..... **$44.50 ea.**

J. J. GLASS ELECTRONICS CO.

SPECIAL

Variable Crystal Oscillator, this is a very late model, beautifully engineered unit. Contains 18 overtone crystals mounted on a turret with a precision geared switching arrangement that simultaneously selects the proper crystal and coil and thus selects the proper frequency with one operation, comes complete with a thermostatically controlled crystal oven and the following crystals: 38.888, 37.777, 36.666, 35.555, 34.444, 33.333, 32.222, 31.111, 30.000, 28.888, 27.777, 26.666, 38.333, 36.666, 35.000, 33.333, 31.666, 30.000. The unit originally was designed to select over 500 frequencies. New condition. . **$14.95 ea.**

TUBES, CRT

3DP1 3" scope tube, produces a circular pattern, good for experimentation ..... **$.97 ea.**
3EP1 3" scope tube, similar characteristics to 3BP1 but smaller base ..... **.97 ea.**
3FP7 3" scope tube ..... **.75 ea.**
707B Klystron, new boxed ..... **$.49 ea.** or **5 for $2.00**

CAPACITORS

Transmitting Capacitor -.01 MFD at 8000V. **$1.49**
Capacitor—1. MUF at 12.5 KV. Mfd. by Pyranol 12x14x4 in. New ..... **$14.95 ea.**
Dual Capacitor—.375 8 KV and 16 KV 9x9x6 in. **$4.95 ea.**

RECEIVERS AND TRANSMITTERS
COMMAND TRANSMITTERS

2.1 to 3 MC ..... **$4.95 ea.**
3 to 4 MC **6.95**
4 to 5.3 MC **4.95**
5.3 to 7 MC **4.95**
7 to 9.1 MC **9.95**
BC 456 modulator used with command transmitters, excellent cond. ..... **3.95 ea.**
DM 32 12 VDC dynamotor **4.95**
DM 33 24 VDC dynamotor **3.95**

SPECIAL

Mobile wonder, 12 volts to 24 volts inverter, to run surplus gear without rewiring, this inverter operates on 12 volt input and produces 24 volts DC at 4 amps. Rotary type, in waterproof case, 10x4x6 in. Full price **$9.95 ea.**

SPECIAL, SPECIAL

Mobile Power Supply, 12 VDC transceiver power supply. Consists of duel dynamotor, mounted on completely filtered base, with choke and starting solenoid, transmitting dynamotor output 420 V at 200 MA, Receiving dynamotor—220V at 100 MA. This supply can be easily attached to ARC-5, ARC-3, 522, etc. Diagram showing hookup included, brand new. ..... **$9.95 ea.**
Spare part kit for above consisting of enough parts to build another power supply. **$4.95 ea.**

POWER SUPPLIES

110 VAC plug in supply for BC 603 & 683, etc. **$9.95 ea.**

SPECIAL

UPM-8 Signal generator, for ham or lab use. Range 980 to 1230 MC. Among the many features, it can be used as signal generator, pulse generator, power meter and receiver. Has built in crystal detector, also a D modulator. A coaxial wave guide piston attenuator and self checking capabilities, compact, etc., excellent condition with 110 VAC power supply. **$49.50**

SPECIAL

24 V. Generator—25 amps, small and compact for mobile rig, new ..... **$8.95 ea.**
HEADSET AND BOOM MIKE ..... **$3.95 ea.**
CONCERTONE RECORDING CARTRIDGE AND PLAY-BACK CARTRIDGE used ..... **both for $1.49**
BLACKLIGHT, complete with gooseneck bracket **$1.49 ea**

1624 SOUTH MAIN STREET
LOS ANGELES 15, CALIFORNIA
TELEPHONES: PRospect 1179-1170

MINIMUM ORDER $5.00

DENSON ELECTRONICS CORP.

ODD BALL SPECIALS

MISCELLANEOUS TRANSMITTERS, RECEIVERS ANTENNAS, SIGNAL GENERATOR, MECHANICAL FILTERS, VTM, TEST SETS, RTTY, SCOPES, GM COUNTERS, MOTOR GENERATORS, ETC. Mostly one of a kind!
WANT MORE INFO? CASH SHORT? What do you offer as part SWAP??? Write and ASK!

TRANSMITTERS AND RECEIVERS

Johnson Viking Challenger, W&T NEW IB Stock #148 ..... $139.95
Johnson Viking Pacemaker, W&T, NEW IB Stock #149 ..... 350.00
Navy TDZ Transmitter by G.E. for 200-400 MC—#139 ..... 150.00
Gonset FM Auto Radio Tuner Mod. 3311 NEW IB—#138 ..... 50.00
Sonar FM Exciter, Like New—IB #129 ..... 20.00
Navy TBX-4 Trans. & Rec. WAC supply and IB NEW #134 ..... 39.50
LW 51 Transmitter, Like New IB #128 ..... 75.00
RME-DB 20 Preselector. Good Condx. #125 ..... 29.95
TeCraft 220 Mc Transmitter less tubes & Xtal #143 ..... 24.50
Hallicrafters Speaker Mod. R-46 in case, Good Condx. #118 ..... 19.95
1 Kw Plate Pwr, Supply using 866 tubes #116 ..... 75.00
500 Watt Modulator using Sola Mod. Trans. & 2-813 tubes #115 ..... 75.00
Transmitter BC-400G—Good Condx. Wt. 450 lbs. #140 ..... 139.95
Globe LA-1 Lenear Amp. (No plate Trans.) IB #145 ..... 50.00
Globe DSB-100 Sidebander 10-80 Meters—Excl. Condx. IB w/vox and Anti-trip #144 ..... 89.95
Globe VFO—755A 10-60M, Excl. Condx IB #130 ..... 49.00
Globe VFO 6-2 6 & 2 Excl. Condx. IB #131 ..... 49.00
Hammarlund SP-66JX Receiver, Excl. Condx. #124 ..... 495.00
Johnson Viking VFO Model 122, Excl. Condx. #132 ..... 39.00
National RBL-56 Bands 14-640KC, Like New 115V AC #121 ..... 100.00
BC-1068A converted for 2 Meters, Excl. #136 ..... 50.00
BC-348 C with 28 v dynamotor, Fair Condx. #137 ..... 50.00
Monitoradio Model MR-10, FM w/squelch Range 152-17Mc Excl. Condx. IB Stock #122 ..... 60.00
S-29 Hallicrafters Sky Travler—works! #127 ..... 30.00
AR-3 Heath in cabinet—Good Condx. IB #126 ..... 25.00
Kingston Absorption Analyzer Like New Stock #940 ..... 149.50
455Kc Mechanical Filter 2Kc, 4Kc, 8Kc or 16Kc Bandwidth STOCK NO. CMF-455 (Specify bandwith) Any type 25.00
R-54/APR-4 Rec. Chassis reconditioned 95.95
TN-16/APR-4 Tuning Units 38-95 mc Ex. Cond. 35.00
TN-17/APR-4 Tuning Units 74-320 mc Ex. Cond. 35.00
TN-18/APR-4 Tuning Units 300-1000 mc Ex. Cond. 39.95
TN-19/APR-4 Tuning Units 975-2200 mc Ex. Cond. 69.95
TN-54/APR Tuning Units 2150-4000 mc Ex. Cond. 149.95

Stock #80

TN-1 38-95 mc. Ex. Cond. 14.95
TN-2 76-300 mc. Ex. Cond. 14.95
TN-3 300-1000 mc. Ex. Cond. 14.95

EXTRA SPECIAL—Our Stock #160 Scintillation Counter—Close out at $19.50

Incomplete counters—20 Micro Amp. Meter, 7 Ranges (.02-20MR/HR) Watertite Case. Completely wired with schematic. All tubes, (Less ONLY 6199 PE Tube, Xtal and Batteries) Requires 2-1.5A and 1-67VB. Made to sell New and Complete for about $289.00
TRIPOD—Camera Equip. Co. Pro Jr. w/head Reg. $187. Net $125.00
DOLLY—for above tripod Reg. $85.00 NOW only 45.00
Rtty Machine Model 14, Tape Printer w/sync motor and table. EXCL. Condx. Stock #844 ..... 49.00
Rtty. Power supply heavy duty—Stock #850 ..... 29.95
Rtty. Converter NEW Alltronics Model K. Stock #880 ..... 189.00
Toroid Inductors 88mhy-Like New—Not potted Stk. #883 ..... ea. 1.00
Matching .30 and .060 condensers Stock # 884 ..... ea. 50c
Home Built Rtty. Converter (as is—with schematic) ..... $ 50.00
C-808/GRC-26A Radio teletypewriter control EXCL. #811 ..... 75.00
CY-827/GRC-26 Frequency Shift Exciter, Excl. #860 ..... 100.00
Sprague Tel-Ohm-Ike Model TO-4 Cond. Anlzr. #960 ..... 75.00
Norelco Projection TV System & Parts. GC. IB #732 ..... 150.00
Engraver-Complete (Ask for spec sheet) Excl. #181 ..... 200.00
Muirhead D-656-F2 FM/AM Conv. Unit Excl. IB #830 ..... 100.00
B & K 750 Test Equip. Calibrator NEW IB #901 ..... 50.00
Wire Recorder Webcor Mod. 80-1 as is IB #62 ..... 25.00
PE-75 Generator only 2500W #177 ..... 199.95
PE-75 Gas Engine Only #178 ..... 129.95
EXCELLENT BOOK ON CLOSED CIRCUIT TV—Stock #187 ..... 5.95
Stock #951—TS111/CP Wavemeter 39.50
Stock #954 TS-47A/APR4 ..... 49.50
Stock #956 AN/UPN-2 ..... 75.00
Stock #958 WE ME 51/UP 100.00
Stock #930 Signal Generator LAD ..... P.U.R.
Some items Just in, not priced. Write your requirement List #790 ..... n/chg

AN URM-33 NEW
TS-34 AP Scope
TS-182 UP
Supreme 552 Scope
FS-182 UP
Minivac 601 Computer
Kay Mega-Sweep
Gates Comp. Amp. GC-1
McEllery tape pullers
TS-148 UP
TS-147B UP
TS-146 UP
TS-140 UP

C.E. MM-2 RF Analyzer. Like New, IB 'SPECIAL' Sk. #944 ..... 100.00
Dual 6 Rack DuMont Type 235 Scope (Less CR tube & lens) Stock # 947 Wt. Approx 400 lbs. 149.95
Tech Apparatur type A.J. Oscilloscope (less CR tube) with schematic TS-100/AP #945 ..... 39.95
Jones Micro-Match Mod. 482A7 New Stock #957 ..... 25.00
Telerex 10 Meter beam 10M-56-79 NEW Condx. Stock #100 ..... 60.00
Telerex 15 Meter beam 4 element NEW Condx. Stock #101 ..... 90.00
Philamon Tuning Fork Resonator (NEW—Net $58.00) IB sk, #981 ..... 25.00
Superior Instruments Co. TV Cross-Bar, IB Stock #938 ..... 25.00

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List #788 N/chg. describes books, schem, conversions, etc. re CCTV

WE ARE PRESENTLY in the market for the following items, either for our own R & D use or to supply customers—IF you have any of them, PLEASE Let us know—

Collins R-390 Receivers
16 and 35mm Zoom Lenses
16 and 35mm Lenses
Astronomical Components
35mm Slide Projector—Kodak Carousel or equivalent
Closed Circuit & Broadcast TV
Cameras, Sync Generators, Mixers, Faders, Monitors, Tripods, etc.
Electric Typewriter
Electric Adding Machine
FM Auto Radios
S-36 Hallicrafters Receivers
Heavy Duty Polar Telescope Mount with Electric Drive
TV Components
Tapetone Sky Sweep Receiver
Centimeg Receiver and Transm.
Clegg Receiver and Transmitter
Johnson 6N2 Thunderbolt
Pentax H3 and Lenses

AMATEUR EQUIPMENT LIST #773 n/ch. describes equipment ranging from good used to new in factory sealed cartons. If we have what you want on hand, I'm sure you can save money. Our present list includes some of the following items:
Gonset G77 Transmitter w/pwr pack, 12 V thin pack, Knight R-100 Receiver, Johnson VFO, Gonset Mobile Converters, RME DB-20 CE Sideband Slicer, RME VHF 152, Viking phonepatch, Gonset 3163 convertor, Johnson Navigator Kit, Challanger Kit, 6N2VFO Kit, Hallicrafters Receivers S-82, S102, etc. WRITE!

$1.00 each buys the Experimenter's "SPECIAL" postpaid
#43—2 PL-68 plugs w cord #34 Sickles 10.7 Mc FM Disc Trans.
#44—2 Amphenol 2 pin plugs #29 IBM Sub-Chassis for parts
#26—3 Printed Ckt. Parts Boards #35 2 FM 10.7 Mc. IF Trans.

Our List #789 of Microwave Equipment is available n/chg. Please request on your Company letterhead.

One Aircraft Reconnaissance Camera Type S-7-A Mfg. Chicago Aerial Survey Co. No Lens #1616 ..... $ 49.50
List #787 N/chg.—Cannon plugs & TV Cable at LOW prices!
Lg. Motor Gen. ONAN—Sgl or 3 ph. Mod. 3ABG-4E/240A. 115 or 220V. 3Kw. NEW IB Stock #176 ..... 495.00
2500 Watt AC Pwr. Plant PE-75 NEW Stock #175 ..... 295.00
Surplus 115 V AC 60 Cycle Gen.-Sep. Excited GC Sk. #179 ..... 79.95
Surplus Heavy Duty 2.5-Kw 115V 60 cycle Gen. GC—Sk. #174 ..... 149.95
RCA Color—Bar Generator WR-61B Like New IB Stock #153 ..... 200.00
RA-42B Power Supply—Good Condx 15.00
Hickok Traceometer—Excl. Condx., Stock #908 & #909 ..... 149.95

SIGNAL GENERATORS

General Electric UHF Gen. Mod LAD GC Stock #930 ..... 139.50
Federal Mfg. & Eng. Corp. 8-330 Mc GC Stock #931 ..... 149.50
Navy LAF-3 100-700 Mc. Approx. GC, IB, Stock #932 ..... 149.50
Measurements Corp. TS-343/U 15-50 Mc. Excl. IB, Stock #933 ..... 75.00
BC-221 Freq. Meter w/orig. calib. bk. AC Like New Stock #934 ..... 125.00
Press Wireless FSTM-1 F.S. Trans. Monitor New, IB Stock #935 ..... 100.00
Press Wireless Mod. HPF-1 Moduplex Filter NEW 10.00

STOCK #187 at $5.95—Excellent book on CCTV gives very comprehensive course in TV Cameras and associated equipment. Our own CATALOGUE #1273 at 50c—illustrated—offers additional information and excellent bargains in TV EQUIPMENT.

TEST PATTERN MONOSCOPE

Here is the easiest way to get your Camera, Transmitter or Monitor set up and operating properly. Our Type 1698 Test Monotron tube with a few parts from an old TV set or the usual electronic experimenters clutch pile used in the simple circuit supplied with the tube gets you started in Closed Circuit or AMATEUR Television Systems. SIMPLER than a flying spot scanner —LESS fussy than a camera, this pattern generator produces a series of figures and numbers from the self-contained pattern.

Stock No. 700FA-2 ONLY $9.95 plus postage—Ship. Wt. 3 lbs.

TV CAMERA SPECIALS

TV TV TV TV TV TV TV TV TV TV TV

SYL/ARG

If you'd like a complete Camera with built in Power Supply for about $50.00 more than the regular net cost of the deflection yoke alone—HERE is the deal for you! These units were made by a prominent manufacturer of CCTV equipment and written up in Radio Electronics, Nov. 1959 issue. The deflection yoke is fastened to the center of the printed circuit board and as sometimes happens during shipping, a heavy jolt causes the board to crack and break. We have repaired some ourselves with less than a day's work. **Most** have built in RF modulator for channels 2-6. Some Video —only—(NO CHOICE). NO Tubes, case, or lens mount but all parts are apparently there otherwise. Spend some time repairing it, tube it up, bend a case of "Do it yourself Aluminum" and you will have a Camera that sold for approximately $600.00 NEW & COMPLETE! Power input 105-128V—60 Cycles AC —50 Watts. RF output .1V into 300 ohm—Channels 1-6. Length 12", Width 7", Height 6" Resolution depending upon lens and Vidicon used 250-300 Lines. Tubes needed: 1—pick-up tube 6198-7290, 3—6BR8A, 2—6DE7. See Vidicon Tube List Page 6. 16mm Lens and Standard Lens "C" Mount—See Page 7. WITH schematic and layout pictures.

Stock #560—$139.50

Approx. ship. wt. 26 lbs.

STOCK #782—Schematics available separately PRICE $1.50

ROCKVILLE, CONNECTICUT

DENSON ELECTRONICS CORP.

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GENERAL:

STANDARDS: EIA, except for aspect ratio (7 x 3).
BAND WIDTH: Flat +2 DB to 9.5 MC. Down 6 DB at 12 MC.
RESOLUTION: Vertical 375 lines; Horizontal 700 lines.
SYSTEM No. 1—Complete Camera—Model No. 700, Stock #485 Power Unit—Model No. 701, Stock #497W. Monitor—Model No. 702, Stock No. 476W, wired and tested with all tubes except Vidicon and less lens (with schematics) plus necessary Cannon Cable connectors and 25' of cable (not assembled) at the low figure of

$495.00—Complete New 3 Unit System—Stock #490

SYSTEM No. 2—Complete Camera, Power Unit and Monitor, as described above, wired and tested (with service manual and schematics) plus one set of wired cables, a tested Vidicon and normal lens; the complete system is being offered at a fraction of the original price.

NOW ONLY—$649.50—Stock #491

Complete WIDE SCREEN INSTRUCTION AND SERVICE MANUAL WITH Schematics—Test voltages and resistances, waveforms, etc., Stock #775—Price $10.00

TV CAMERA SPECIALS

Stock #485 $229.50 Model 700 CAMERA—BRAND NEW tested and complete with all tubes including a tested Vidicon and lens mount (NO lens—see list page 7) Cannon cable plug and schematics incl.

Stock #486 $199.50 Model 700 CAMERA—Same as #485 but less all tubes. Cannon cable plug and schematics included.

Stock #487 $99.50 Prototype TV CAMERAS of same appearance as Stock #485 externally, but may have some small tubes missing. NO Vidicon, Lens or lens mount included. All parts of the cabinent, deflection yoke and focus coil, vidicon socket, etc., are included with schematic as originally designed for use with external sync and power. Repair them and SAVE!

Stock #484 $99.50 Misc. HAM-BUILT TV CAMERAS of various types (all for 1 inch Vidicon). Contain at least the deflection yoke and focus coil, vidicon socket, case, etc., small tubes left in as received—NO Vidicon, lens or lens mount. Schematic as supplied (if any) are those we receive when they are traded in. "Not always in Stock" WRITE for current list. See Page 8—CATALOGUE #1273

Stock #492 $99.50 BASIC COMPONENTS PARTS KIT for Model 700 CAMERA consisting of all NEW parts including complete case, chassis, deflection yoke and focus coil, Vidicon socket, some condensers and resistors, etc.,—with schematic and drawings. NO Vidicon, Lens or Lens Mount. Parts listed. See Pix #492

(1) Camera Case Cover
(2) Camera Case Bottom Plate
(3) Camera Case Front
(4) Camera Case Rear
(5) Vidicon Focus Coil
(6) Vidicon Deflection Yoke
(7) Vidicon Socket
(8) Front sub chassis
(9) Rear sub chassis
(10) Vidicon Front Focus Coil Mount
(12) Base plate angle
(13) Vidicon base plate Panel
(26) Vidicon Tube Neck Clamp
(30) Cannon Chassis Connectors-w mate 24 Conductor (3 Co-ax)

PLUS Camera Schematic and Miscellaneous drawings

Stock #778 $5.00 Schematic and drawings for #492 available separately. Stock #485, 486, 487 and 492 when used with a NORMAL 16 mm lens have the standard 4 x 3 aspect ratio and require the addition of the anamorphic element, see list page 7, to convert the image to 7 x 3 ratio. All have video amplifiers, blanking amp and cathode follower outputs and are designed to be used with external sync and power units on either random or EIA interlace. Shipping weight of any of the above cameras—10 lbs.

Stock #770 $49.95 Direct Drive deflection Yoke and Focus Coil as used in above cameras—Shipping weight—3 lbs.

TV MONITORS

Monitors made by TV Utilities, Private Eye and others. These monitors as described are for the most part BRAND NEW units complete with all parts mounted, wired and tested, having been built for high commercial standards—the quality of components is exceedingly high. Their performance when properly completed will meet the most exacting requirements. No tubes are supplied and due to shipping, minor repairs may be required. Schematics and other information supplied as noted.
Most of these monitors having been designed for continuous duty and rugged service have large power transformers and steel carrying cases. This results in an extremely serviceable unit which is also fairly heavy —Consider this when specifying how to ship.

Stock #407—$99.50
Here is a BEAUT—Similar to S-K KR-1A. Mfg. specs read like this—Originally sold for $1400.00—Resolution 500 lines or better. 2 Video and 2 Sync Inputs—bridging—negative or positive picture polarity. Less all tubes and requiring minor repairs.

Stock #404 $69.50
An excellent Monitor contained in a steel cabinet 16½" high, 15" wide, 20" deep using 11 tubes, 12" picture tube. This unit will give you one of the finest tabletop monitors at the lowest cost you have ever come across. Supplied with a representative schematic and tube layout for this particular unit. NO Tubes supplied. Net Wt. Approx. 70 lbs. #405 LOOKS LIKE #404

Stock #405 $49.50 SPECIAL SPECIAL
SPECIAL
An Excellent unit with a very husky power transformer designed for continuous operation completely wired with 6 Co-ax connectors for various inputs using 19 tubes and a 17" picture tube. 7 front panel controls. Supplied with a matching steel case 19" wide, 17½" high, 21" deep. Front panel estucheon. SPECIAL

SPECIAL SPECIAL SPECIAL
Stock #408 $49.50 Beautifully built on a standard 19" rack, 10½" high is a rugged chassis for high definition monitoring. Required 10 small tubes plus the 8AP4A Pix tube. Minor repairs will be required, a little paint and work and you'll be proud of it in your own station. Not shown. Pix on request.

DENSON ELECTRONICS CORP.

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TELEVISION ACCESSORIES

SYNC GENERATOR

POWER SUPPLY MODEL 701
SYNCHRONIZING GENERATOR

Power supply unit includes Synchronizing Generator. Crystal Controlled with Special 25-21 Count Timer (Patent Pending) to Provide Fully Interlaced 525 Line Scanning (EIA Standards). 115V-60 Cycle. Voltage—Regulated for 105-130 volts line/200 Watts. Weight 24¼ lbs. net; Approx. Ship. Wt. 34 lbs. (All Models)
Height 12¾"; Width 20"; Depth 11¼".
TUBE COMPLEMENT: GZ34/5AR4; ECC83/12AX7; 6080; ECC81/12AT7; OA2; 6CA7/EL34; 6AL5; ECC82/12AU7(2); 7119/E182CC(2) 904 Transistor. Model #701 uses 11 tubes and Xtal with transistor for EIA Sync and also has regulated power supply for Vidicon camera BRAND NEW

Stock #497W $229.50 Regular net $690.00 COMPLETE with all tubes, Xtal, Transistor, necessary Cannon cable end plugs—Wired and tested, ready to plug in & use.

Stock #497 $199.50 Same as above less Xtal, Transistor and Cannon cable end plugs but with all 11 tubes.

Stock #498 $149.50 Same as #497 except minor repairs required.

Stock #493 $99.50 BASIC COMPONENTS KIT—Less small resistors, condensers and power transformer (Use any old TV set unit.) Supply your own misc. small components and tubes. Parts supplied—See Pix #493

(1) Punched Chassis completely painted and silk screened with mounted test points
(2) Chassis bottom plate
(3) Chassis cover
(4) 31.5 Kc Xtal and socket
(5) Transistor and socket
(6) Vertical output to Vidicon Yoke Transformer
(7) 2—Cannon Chassis connectors to feed monitor and camera
(8) 2—Matching Cable end plugs
(9) A.C. Power cord
(10) Horizintal EXP coil
(11) A.C. Power relay
(26) 2—500 mfd. 50 volt condx.
(27) 1000 mfd. 3 volt condenser

PLUS 1—OA2 Tube
1—6080 Tube
WITH Complete Set of Schematics, drawings, etc.

Stock #496 $49.50 Same as #497—NO tubes, Xtal, transistor, some parts missing—Need considerable work to place into operation.

Stock #499 $99.50 These are Prototype Units of Model 701 on 9-500 chassis with all tubes; NO Xtal or transistor—Some are working.

ALL ABOVE SUPPLIED WITH SCHEMATICS, DRAWINGS, ETC.

Stock #488R $149.50 Brand NEW—For those who do not need EIA interlace Sync, we offer these units. Same General appearance as Stock #497, except wired RANDOM Sync (not interlaced). They have same regulated power supply and do not use Xtal. Completely wired and tested with all 10 tubes and Cannon Cable plugs.

Stock #488RX $129.50 Same as #488R above less tubes and Cannon Connectors. May need minor repairs.

Stock #776 $5.00 Model #701 Schematics and Drawings available separately—Approx. Ship. Wt. 1 lb. (for Sync Generator & Power Supply)

Stock #495W $129.50 Model 9-500 uses 17 tubes and is an earlier version of the Model 701. Complete with all 17 tubes (less Xtal and transistor)

Stock #495 $99.50 Same as #495W above less all tubes. Xtal and transistor

TV MONITORS

MONITOR MODEL 702
Picture Display: 19" x 8½".
Weight 74 lb.; height 19"; width 24½"; depth 17¾".
Tube Complement: GZ34/5AR4; 6080; 6CG7(2); OA2; 6W6 ECC83/12AX7; 6AU4; 6DQ6; 1B3; 6CL6; E88CC/6922; 21DAP4 (Cathode Ray.)

Stock #476W $229.50 This is one of the finest 21 inch CCTV Monitors available and used in the wide screen system shown on page 6. Full remote controls for Vidicon Camera Focus, beam, target plus monitor brightness, etc. Resolutions 375 lines—vertical 700 lines horiz. Change front mask and one tube to switch from 7 x 3 aspect ratio to standard 4 x 3. Output to drive additional slave units. Voltage regulated power supply. BRAND NEW—completely wired and tested with all tubes, schematic, etc. Reg. net Price—$690.00 Net. wt. 74 lbs. Ship. wt. approx. 95 lbs.

Stock #477 $179.50 Same general description as #476W except earlier models, some in need of minor repairs but complete with all tubes, schematics and 21DAP4 picture tube, etc.

Stock #494 $99.50 KIT of Basic Components for Model 702 MONITOR comprising the following:

(1) 2 pix tube Mtg straps
(2) Cabinet Back Cover
(3) Top Vert Chassis bracke:
(4) CRT Mask
(5) CRT Herculite Glass
(6) Monitor control panel
(7) Input Elec. Cond.
(8) A.C. Line cord
(9) 2 Cannon chassis connectors
(10) Jones plug and mate
(12) Punched Heavy aluminum Vert. chassis
(14) H.V. Flyback trans and case
(30) Vertical output trans
(39) H.V. Rect. socket
(46) CRT socket
(58) Wired and tested Printed Ckt. Bd.
(76) Bottom Chassis with R. & L. Bkts.
(78) CRT Deflection Yoke
(92) Cabinet

PLUS 1—6080 Reg. Tube
1—OA2 Reg. Tube

WITH Schematics drawings, etc. NO Power Transformer included. Most any TV set transformer will work as requirements due to regulated power supply are not too critical. Ship. Wt. 60 lbs.

Stock #494CR $129.50 Same as #494 but includes a BRAND NEW 21DAP4 Cathode Ray tube mounted in the cabinet. Approx. ship. Wt. 80 lbs.

Stock #780 $5.00 Schematic and drawings available separately for Kit #494—Ship. Wt. 1 lb.

ROCKVILLE, CONNECTICUT

DENSON ELECTRONICS CORP.

Specially selected "GOODIES", the CREAM of military & industrial surplus at SKIM MILK PRICES.

All items guaranteed as described, NEW, except *, removed from equipment, usually new, but in operable good condition. Prices are NET, FOB our store, Chicago. Mail orders, please include sufficient for postage & insurance. For Illinois delivery add 4% sales tax. Ship weight (xx) pounds.

NUVISTORS, NEW, RCA, bulk packed, postpaid.

7587, industrial tetrode, **$3.65 ea; 3 for $10.50**
6CW4 sharp, 6DS4 remote, triode; **$1.85; 3/$5.25**
SOCKETS, CINCH-JONES, **29c ea; with 3 above 3/50c**

TUBES—CRT, TRANSMITTING, RECEIVING

902P1 $3.00; 3AP1 $2.95; 3EP1 $1.95; 3GP1* $1.95; 3B28* $3.25; 6DQ5* $1.75; 5933 $1.85; 6146* $3.00; 837 $1.50; 829B* $5.50; 836* $1.50; 5992 $1.50 $1.00 each, 4 for $3.75
807*; 6DQ6B; 1616; 6J4*; 6AN5*; 6105; 5654*; 3B24 1625 tubes, NEW; SYL, N.U., Ken-Rad, R.C.A., or TUNG-SOL, minimum mail order 12/$2.00

TUBE ACCESSORIES—Sockets, Caps.

A B C D E F G H

A) EFJ #209, bay. base, for 866, etc. **69c; 3/$1.95**
A) as above, wired in pairs, **69c pr; 3 pr/$1.95**
B) 4 pin cer. wafer, for 856, etc. **29c ea; 4/$1.10**
C) EFJ #234, 4 pin for 5D21. NEW, **50s ea; 3/$1.35**
D) Cer. wafer for acorn tubes, NEW, **29c; 4/$1.10**
E) 9 pin min. shield base, blk bake. **23c; 5/$1.00**
F) 7 pin min. saddle mt. blk or tan, **10c; 12/$1.00**
G) 7 pin rirg mt. blk bakelite, **10c ea; 12/$1.00**
H) 9/16" cer. plate cap* for 866, **20c; 6/$1.10**

CO-AX Connectors—lowest prices—anywhere!

BRAND NEW, current production, except * takeouts, resilvered; $ surplus clean & bright.

A B C D E F

A) Double male 95, 5/$4.60; B) PL-259 55c, 5/$2.65
C) PL-259 45c, 5/$2.00; D) M-359S, 23c ea: 5/$1.00
E) SO-239 40c ea, 5/$1.85; E) SO-239* 29c, 4/$1.10
F) UG-175/U or **UG-176/U**, choice **11c** ea, **10/$1.00**

CO-AX CABLE

RG8/U, poly-foam, NEW, **13c ft; 50' $6.25;** 100' $12
RG11/U*, 72 ohm, used, with 2 PL-259, 18' **$1.25**

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G) 3-25 mmf*, APC, screw driver adjust; **29c; 4/$1.10**
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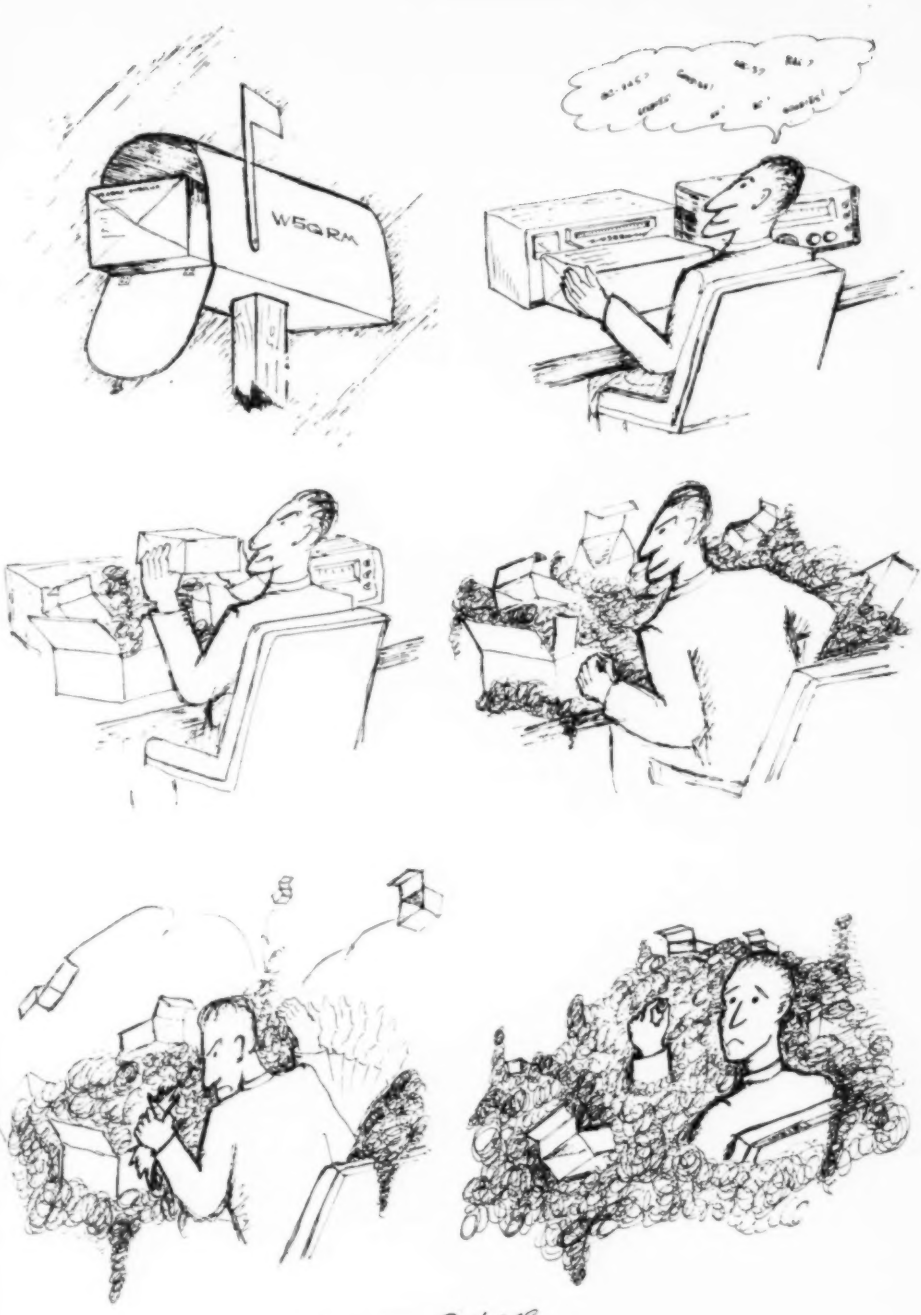

Surplus Package

Bill Moore W5IMJ/5

A Bargain Receiver for 220

the R-48/TRC-8

Bert Soltoff K3IUV
8582 Benton Avenue
Philadelphia 15, Pennsylvania

If you are contemplating the purchase of an item of surplus equipment it should satisfy one of two requirements. The first is that it should be readily adaptable with minor changes to the intended application. If it does not meet the first requirement, then consider its purchase only if it contains a large assortment of useable parts. If it does not meet either of these requirements forget it, as your garage or basement is probably well stocked with useless parts already.

A piece of surplus equipment that meets the first requirement is the R-48/TRC-8 receiver. This receiver is available at a very moderate price, and represents an excellent investment. Originally intended as an FM receiver covering the range from 230 to 250 mc, this receiver can provide excellent performance on the 220 mc band. Don't let the FM part discourage you —read on. The receiver contains a built in 110 v 60 cycle power supply, a low pass filter in the audio amplifier (3 kc cutoff), a built in speaker, a separate 500 ohm audio line amplifier, metering of the individual plate current of each of the stages, and the use of tuned lines for the front end of the receiver.

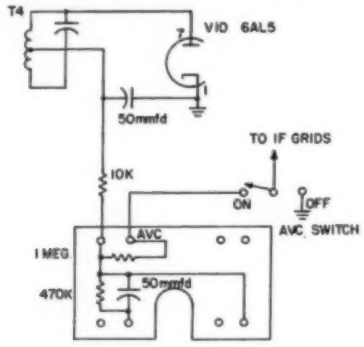

FIG. 1

What are the drawbacks? Well for one thing, the FM detector is useless for our purposes since 95% of the 220 activity today is AM (the other 5% is SSB and CW). Another drawback is the tuning range of 230 to 250 mc. This is no real problem since it is a simple matter to move this range down to 220 mc. The third drawback is that the *if* bandwidth is rather broad as compared to the normal communications receivers that we are accustomed to using. But this is actually a blessing in disguise. If you use this receiver for net operation, the normal problems associated with stations off frequency by a few kc will never be noticed. While the signal/noise ratio is degraded slightly by the wide *if* bandwidth, the built in audio filter compensates for it by eliminating the higher frequency noise background that masks weak signals. Fourth drawback—no AVC. Here again no problem as it is easily added. The original receiver included a squelch circuit, however, the squelch is operative on FM only and in converting to AM the squelch action is lost. If you wish to include a squelch in your converted receiver it is easy to do so. The well known TNS circuit functions admirably in the receiver and provides noise limiting as well. If you are convinced of the virtues of the receiver by now, I will present a step by step description of the conversion. There are three basic parts to the conversion. First is changing the tuning range. Second is converting from FM to AM. Third is adding the squelch if desired. Ready? Grab your soldering iron and let's go.

Front End Conversion

1. Remove bottom cover from tuning gang.
2. Mount small solder lugs on rf and mixer gang just like the one already on the oscillator gang.
3. Solder 3.3 mmfd ceramic capacitors

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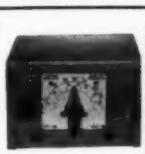
from the two lugs to ground and replace cover on the tuning gang.

4. Set the meter switch on the "1st lim I_g"; set the tuning dial on 230 (now corresponds to 220) and peak osc, rf and mixer trimmers for max meter reading, using a signal gen on 220 or an 8150.0 crystal in your exciter.

FM to AM Conversion

1. Carefully remove T4 (orig discrim) from chassis. Clip R99 & R100 (15K) & C69 (100 mmfd) from inside T4. Remount T4.
2. Remove V8 and V9 (limiters—no longer needed).
3. Remove R36 (4.7K) from pin 1 of V8 and run short wire from pin 1 of V8 to term on T4 that came from pin 5 of V9.
4. Ground other end of primary of T4.
5. Connect pin 7 of V10 to either end of secondary of T4.
6. Remove all components (not wires) on term board on V10 subchassis.
7. Add 50 mmfd from centertap of T4 to pin 1 of V10.
8. Add 10K from centertap of T4 to terminal lug shown in Fig. 1.
9. From end of 10K, add 1 meg to terminal lug, 50 mmfd to ground, 470K to ground, and jumper to other lug (wire from C79).
10. On orig. squelch switch; on side that uses all three terminals of switch, ground black wire. On opposite end of same half of switch, remove existing wire and replace with a wire to end of the 1 meg added in step 9.
11. On other pole of the same switch, move wire from center term. to unused outer term. to disable the orig squelch relay. This switch now functions as an AVC on-off switch.
12. Remove and gnd black wire at the junction of R14 and R12. This removes the AVC from the rf amplifier.
13. Short R87 (560 ohms) on bottom volume control.
14. Place meter switch in *if* position where



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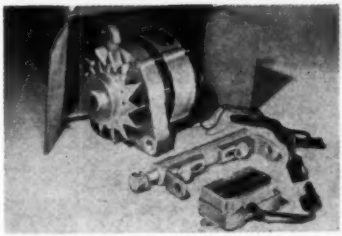

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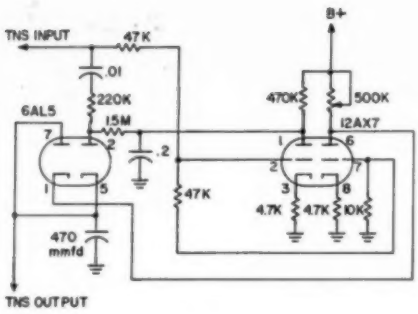


FIG. 2

it will function as a backwards S meter and tune T4 and LI4 for max indication using same signal source as before.

The basic conversion is now complete and you should be able to hear signals on the air if there is any 220 activity. You may wish to peak up all the *if's* on a signal once you have the receiver operating. This is easily done by observing the meter in the *if* position and tune for maximum downward deflection of the meter. Be sure the AVC switch is in the on position. If you now desire to add the TNS circuit, you can either assemble the parts on a little subchassis, or buy a printed circuit board for it. The printed circuit board is available from Irving Electronics and is well worth the dollar it costs. To install it, proceed as follows.

Addition of TNS

1. Obtain TNS circuit board or subchassis and mount the components on it.
2. Remove L16.
3. Attach wires to the TNS circuit as required and use spacers to mount it to the side of the receiver, above chassis.
4. Route wires through hole left by L16.
5. Remove original squelch pot-tuck out of way with leads on.
6. Mount new squelch pot (500K).
7. Remove 470K and wire jumper previously added on termboard and connect TNS input to their junction.
8. Connect output of TNS to where end of wire jumper went.
9. Connect filament lead of TNS to pin 3 of V8.
10. Connect B+ lead of TNS to red wires on terminal strip.
11. Connect pot leads of TNS to the new squelch pot.

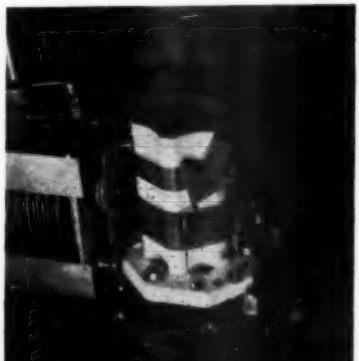
Fig. 2 shows the schematic of the TNS circuitry. This squelch circuit is very effective, and if the majority of activity on the band in your area is on one frequency you can use the receiver to monitor that frequency while operating on another band. Since no background noise is present when the squelch is on, the receiver does not interfere with your other operations. About thirty of these receivers were modified in the Phila. area, and all are operating satisfactorily. The performance is quite good and many checks have been made by switching back and forth between this receiver and a low noise converter feeding a communications receiver with very little difference in receiving capability being observed. Incidentally, when you purchase the receiver be sure you get the schematic diagram which is printed on a metal plate and screwed inside the shipping cases. Hope to hear YOU on 220 soon.

. . . K3IUV

Three for the ARC

Frank Benzon W7ATK
Route 2, Box 66
Burton, Washington

For some of us it's a sobering thought that there are hams on the air today with SCR274/ARC-5 gear who are too young to remember when command sets were new on the surplus



If you do any coil-pruning don't forget to bring some of the turns to the top of the coil form to keep the slug effective. The arrow indicates the grid tap.

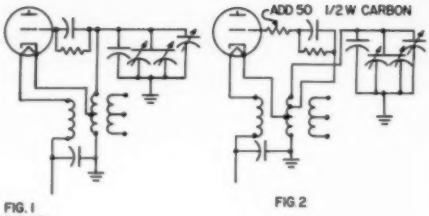


FIG. 1
ORIGINAL

FIG 2

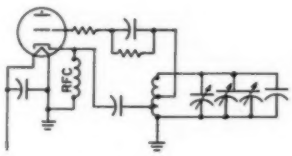


FIG. 3

market, and let's not dwell on it. However, the ubiquity of this equipment after so many years is a real tribute to the men who designed it, and the number of operational units still on hand probably is exceeded only by the number of articles written about it.

By now it isn't likely that any reasonable modification of the command transmitters will be new to everybody, but if you haven't yet worked one over, you will find these suggestions helpful in improving the stability of the oscillator.

Fig. 1 is the original circuit with the grid connected to the top of the coil and both sides of the filament above ground for rf. In Fig. 2 the grid is tapped down on the coil to reduce the loading and improve circuit Q. At this point a fifty ohm carbon resistor should be added in series with the grid to prevent parasitics. In Fig. 3 the oscillator has been changed to a 6AG7 and the cathode current eliminated from the coil by adding a .001 silver mica blocking condenser and grounding the cathode through a 2.5 mh rf choke.

These modifications were preliminary steps in turning a 2.1 mc to 3.0 mc ARC-5 into a VFO and provided the extra stability requisite for sideband. Specifically to spread the 2.5 mc to 3.0 mc range for calibration convenience

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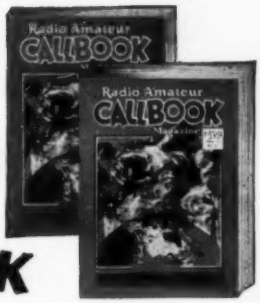

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the coil was trimmed to twenty seven and one half turns, with the cathode tapped at the ninth turn and the grid tapped at the seventeenth turn from the bottom. For eighty the output is mixed with a 1 mc crystal oscillator, for forty with 4.5 mc and for twenty with 11.5 mc. Of course the purpose of this heterodyning is to extend the level-headed virtues of three megacycles to the upper bands, and the coil pruning data is supplied in the event that this approach interests you. Should you prefer trying eighty or forty with another unit of the series, and without voiding the warranty unnecessarily, tapping the grid down, adding a parasitic-choker and separating the coil and the cathode current will help an old friend do a good job.

. . . W7ATK

The AN/ARC-5 Command Receivers

Roy Pafenberg W4WKM
316 Stratford Avenue
Fairfax, Virginia

The AN/ARC-5 Command Set Receivers are widely available on the surplus market and, for sheer utility, they cannot be equaled at the going prices. Although more has been written on the Command Set receivers [1] than on any other surplus electronic equipment, there is a distinct lack of information on the AN/ARC-5 version.

Many published articles on the Command Set receivers describe an application or conversion of the SCR-274-N components and then wind up with the statement that the instructions are generally applicable to the AN/ARC-5 equivalent. Let's face it—the AN/ARC-5 is different. Also, the AN/ARC-5 receivers are better in several respects. Increased audio output in the navigational receivers and the inclusion of AVC in all models are two of the significant improvements. Wiring in many models is improved by use of plastic insulated wire. Also, the black crackle finish of the AN/ARC-5 components is a distinct improvement over the bare aluminum used in many of the SCR-274-N models.

To provide a ready reference, a brief rundown on the characteristics of the AN/ARC-5 Command Set receivers is in order:

These units, along with the SCR-274-N receivers, all have certain features in common. All were designed for operation from a 24 volt dc aircraft power system and contained a dynamotor to supply the required plate voltage. All units were designed for remote operation and so no tuning knob, rf gain control, BFO or power switch were provided. All the receivers are equipped with a rear-chassis connector which established power and control connections when installed in the aircraft equipment mounting racks. In addition, most of these terminations are duplicated at a recessed front panel connector. This cutout was normally filled with a blank remote control adaptor panel although various special purpose adaptor panels are available. Among these is the type C-24/ARC-5 local control unit.

It is impossible to list, in the available space, all amateur uses of the Command Set receivers or to describe any conversion in detail. These units have been used for everything from Novice receivers to *if* elements in successful amateur moon-bounce experiments. The basic conversion consists of installing a tuning knob and the C-24/ARC-5 local control unit or home-brew

Type	Frequency Coverage	*IF* Frequency	Sensitivity*	Selectivity** 6 db	20 db	40 db	60 db
R-23/ARC-5	19 - 550 kc	85 kc	5 μv	2.2	4.4	6.6	9
R-24/ARC-5	.52 - 1.5 mc	239 kc	7 μv	4.2	8	12	16
R-25/ARC-5	1.5 - 3.0 mc	705 kc	7 μv	6.4	12	18	26
R-26/ARC-5	3.0 - 6.0 mc	1.415 mc	6 μv	14.6	26	38	52
R-27/ARC-5	6.0 - 9.1 mc	2.830 mc	6 μv	26	52	80	112

* Signal level in microvolts, modulated 30% at 400 cycles, required to produce 10 mw audio power into a matched 300 ohm load.

** Selectivity is defined as the separation in kilocycles of the two points on the overall rf-*if* response curve where the signal level is down the specified amount.

1 "Index to Surplus," available from 73 Magazine for $1.50, lists 82 articles on Command Set receivers that have been published since 1946.

equivalent. A phone jack and connection of 28 volts ac and B+ to the back connector completes the job.

The high frequency units may be used as complete amateur band receivers and the low frequency navigation receiver works wonders in the famous "Q5-er" application. In this use, the antenna of the Command Set receiver is coupled to the last *if* stage of the normal station receiver and tuned to the *if* frequency. The greatly increased selectivity of this outboard unit will improve the performance of older or less expensive current production receivers. The reference lists a host of magazine articles citing numerous other applications along with full conversion details.

This just scratches the surface. Accumulate the references, buy a receiver, and dig in. You can scarcely go wrong and nowhere can you get so much performance, along with practical experience, for so little money. . . . W4WKM

Letters

Dear **Wayne**,

I dropped my subscription to CQ because of the OLD MAN. I can't see how he turns out so much garbage on a "part-time" basis. The following may be interesting to Apache-SB-10 owners: I've found out that I get a little better operation and a lot cooler transmitter when I use a separate power supply for the SB-10. The 140 ma voice peaks are quite a strain on the Apache.

. . . **Neil Lilien K2MRB**

Dear **Wayne**,

Here is an idea for converting 6-volt car radios to twelve volt operation. The conventional method is to use a ballast resistor in series with the radio. My approach is to use the filaments themselves for the series resistor, and to connect the vibrator supply in series with the paralleled filaments. The average set draws two amperes in the vibrator supply and two in the filament supply. This makes them draw close to six volts when connected in series, and no current is wasted on a ballast resistor, hence, total power drain is less.

. . . **Lee Tomes K1IFK**

Dear **Wayne**,

Many thanks for the excellent article "432 mc Gallon" by K2TKN. However a word of caution should be exercised by all amateurs when experimenting with high power in the UHF region.

Since the low end of the microwave region (300-1000 mc) has the deepest penetration of the skin, it can destroy or damage internal living organs of the body with prolonged exposure. Power outputs of 200 watts or more at 400 mc can be dangerous if not handled properly.

. . . **Arnold J. Carmody K2BZC**

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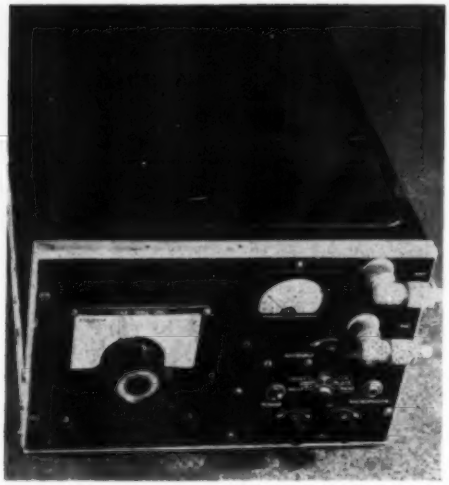


Conversion of the T-67/ARC-3 to a Table Top, Home Station Transmitter.

Still Another 2 Meter Conversion

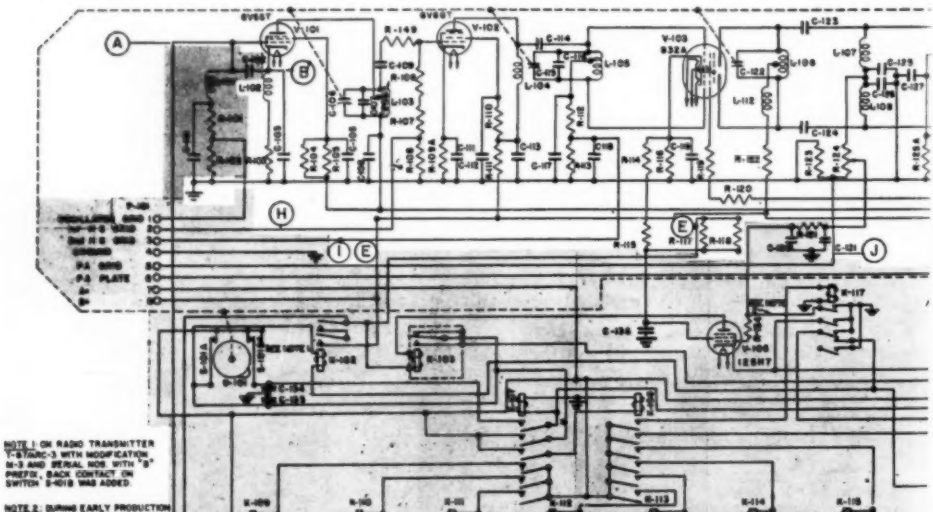


Fig. 4: Schematic diagram of the T-67/-ARC-3. Shaded areas indicate deleted wir-

The companion unit to the R-77/ARC-3 receiver [1] is the T-69/ARC-5 transmitter. This unit is an AM, VHF transmitter with an output of 8 watts on any one of 8 crystal controlled frequencies in the range of 100 to 156 mc. The transmitter is reasonably compact, measuring approximately 7½" x 12" x 15¼", and weighs some 21 pounds. This equipment was designed for aircraft service and used an external dynamotor to supply 400 volts dc at 325 ma. The usual 28 volt dc aircraft supply was used for the tube filament strings, relays and microphone.

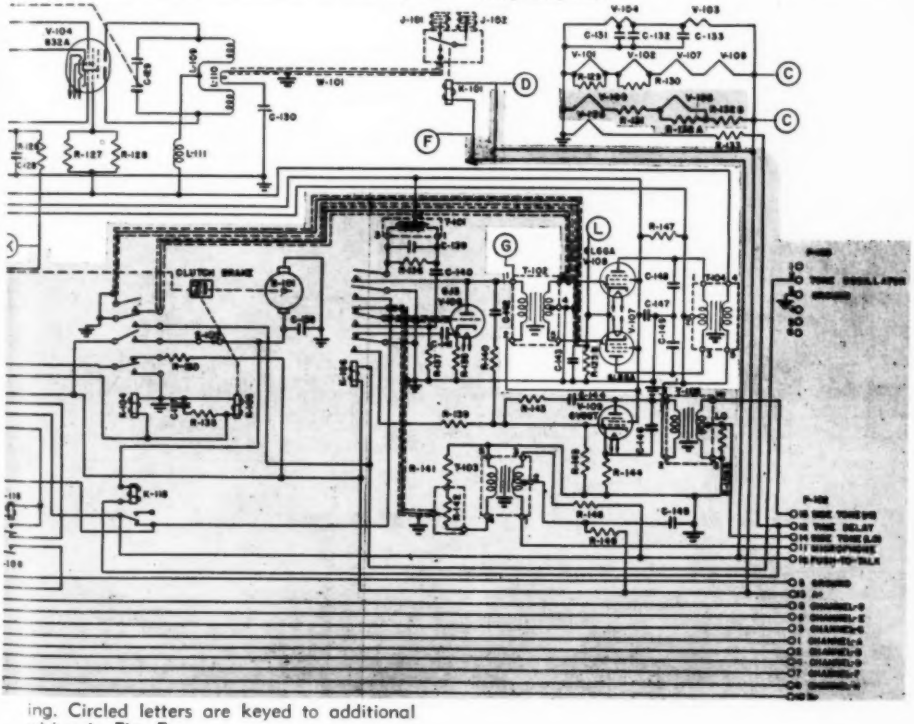
The transmitter easily converts to amateur service, however considerable work is required to end up with a commercial appearing unit. The major attraction of the T-67/ARC-3 is the current market price which ranges from $12.00 to $20.00, depending on source and condition. At this price, a substantial investment in time and effort in the conversion is justified.

The circuit uses 9 tubes, two of which are deleted in this conversion. Fig. 3 shows a block diagram of the transmitter. A 6V6 modified Pierce oscillator is used with the plate circuit tuned to the second harmonic of the crystal. A second 6V6 is used as a tripler, driving an 832 which triples to the air frequency. A second 832 is used as the power amplifier which is link coupled to the antenna through an internal, coaxial antenna change-over relay. The speech section uses a 6J5 driver for the push-pull 6L6 modulators. Sidetone amplifier (6V6) and automatic tuning control (12SH7) stages are provided but are removed during the conversion. The motor driven, automatic tuning system is deleted completely.

In common with much aircraft gear, most of the equipment complexity derives from the multi-channel, remote control requirement. The system used is almost identical to that of the R-77/ARC-3 receiver. The theory of operation was described in detail in the previous article and will not be repeated here. The only substantial change is that the tuned circuits will not resonate to any but the desired crystal harmonics so that the pre-set lock-out is not required.

In this conversion, the automatic tuning and crystal selection circuits are deleted and the required controls are brought through a new

1 Another Two Meter Conversion, W4WKM, 73 Magazine, Dec., 1961.



ing. Circled letters are keyed to additional wiring in Fig. 5.

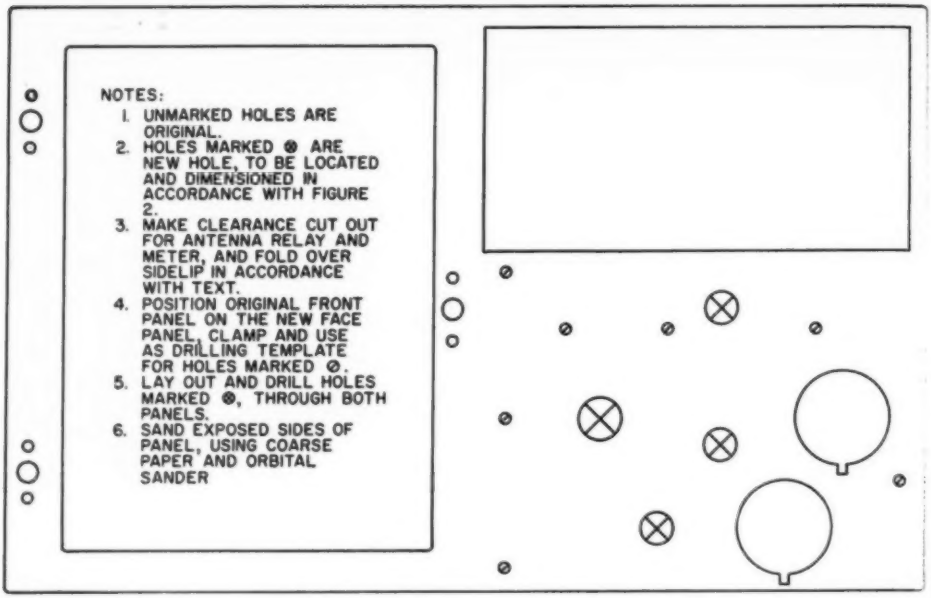

NOTES:
1. UNMARKED HOLES ARE ORIGINAL.
2. HOLES MARKED ⊗ ARE NEW HOLE, TO BE LOCATED AND DIMENSIONED IN ACCORDANCE WITH FIGURE 2.
3. MAKE CLEARANCE CUT OUT FOR ANTENNA RELAY AND METER, AND FOLD OVER SIDELIP IN ACCORDANCE WITH TEXT.
4. POSITION ORIGINAL FRONT PANEL ON THE NEW FACE PANEL, CLAMP AND USE AS DRILLING TEMPLATE FOR HOLES MARKED ⊘.
5. LAY OUT AND DRILL HOLES MARKED ⊗, THROUGH BOTH PANELS.
6. SAND EXPOSED SIDES OF PANEL, USING COARSE PAPER AND ORBITAL SANDER

FIGURE 1

front panel. In this connection, it will be noted that the photographs and the panel drawings show an output coupling control. Aside from being a mechanical nightmare, experience has indicated that this control is not actually required and it may be deleted in the interests of simplicity. The crystal oscillator is converted to a VFO and a meter and meter switch are added. An ac operated power supply is added and is self contained except for the 115 volt isolation transformer. *WARNING!* The voltage tripler power supply used places the chassis at ac line potential. Do not operate without an isolation transformer as shown in Fig. 5.

While it is desirable to follow the concept of minimum required change in surplus conversions, the best approach is often difficult to determine. In this case, two choices existed. All control, audio and power circuit wiring could be removed and the transmitter rewired almost from scratch. On the other hand, since the transmitter wiring is neatly laced and the wiring harness is held in position with a generous number of cable clamps, it is possible to slit the lacing where necessary and still retain the neat wiring arrangement. After a careful study of the transmitter, the wiring diagram and the schematic, it was decided to use the original wiring scheme with deletions and additions as required. The first wire out of a run is the hardest; the rest are easy.

The unused wiring and parts are removed first; new parts and wiring are left until the trees can be distinguished from the forest. The

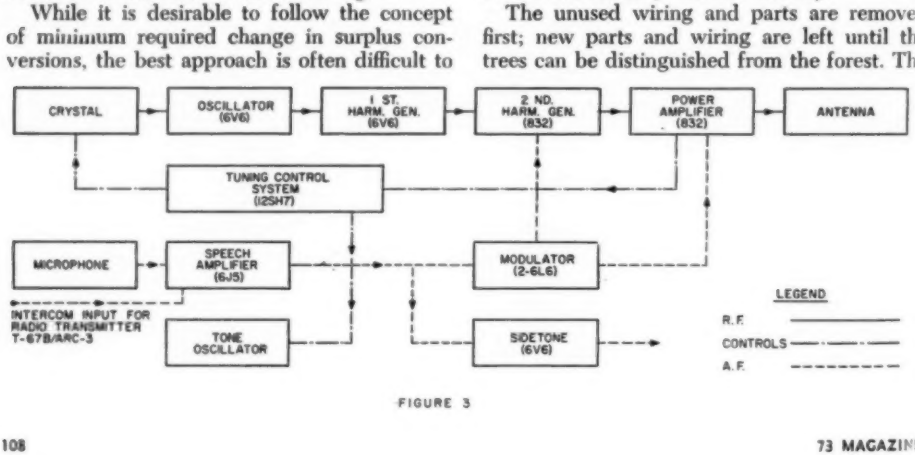


FIGURE 3

step-by-step instructions may seem complex and difficult, but work progresses rapidly and the procedure is self-checking.

Remove the transmitter from the shockmount base and discard the base. Scribe the oversize bottom plate, along the sides of the case. Remove the bottom plate, shear to the scribe marks and discard the scraps. Remove and discard the snubber brackets secured to each corner of the chassis. The rear brackets are riveted in place and the rivets should be filed off. Fill the vacant holes with machine screws. Remove and retain the top cover of the case.

Remove and discard the crystal access door. File off the three rivets which secure the protective strip to the top lip of the front panel. Remove the nomenclature plate and discard along with the mounting screws. Remove and discard the 6L6 and 832 tube hold-down clamps. Remove and discard V-105, V-106, V-109 and K-103; replacing V-106 (6J5) with a 12J5 tube.

Remove the hardware mounting all components on the front panel and remove the panel. Drill and cut the panel as shown in Fig. 1. The projection on the panel on which the connectors are mounted should be peened over to present a smooth surface on which the new face panel may be mounted. Sand or steel wool the edges of the panel and the sides and back of the chassis. Using 16 gauge sheet aluminum, cut and drill a new face panel in accordance with Fig. 2. Make sure the holes in the two panels register. Finish the top cover and the new face panel in flat black lacquer and set these items aside for future use.

Unsolder from Pins 1 and 5 of V-101 the white-black and white-green leads which run from the back of the crystal box. Dismantle and discard the crystal box, leaving the crystal socket-relay assembly intact. Cut the lacing on the cable between this assembly and P-102. Cut out and discard the leads running between Pins 1, 2, 3, 4, 6, 7, 8 and 9 of P-102 and the relays. Slit the cable harness as required, unsolder the chassis end of the following wiring and discard the complete crystal socket-relay assembly:

FROM	COLOR CODE	TO
Coil, K-109	White-Brown-Red-Green	Contact, K-107
Coil, K-110	White-Brown-Red-Blue	Contact, K-107
Coil, K-111	White-Red	Contact, K-107
Coil, K-112	White-Black-Brown-Green	Contact, K-108
Coil, K-113	White-Black-Brown	Contact, K-108
Coil, K-114	White-Brown-Red	Contact, K-108
Coil, K-115	White-Brown-Green	Contact, K-108
Coil, K-116	White-Black-Brown Orange	Contact, K-108

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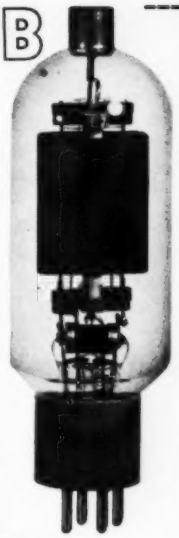

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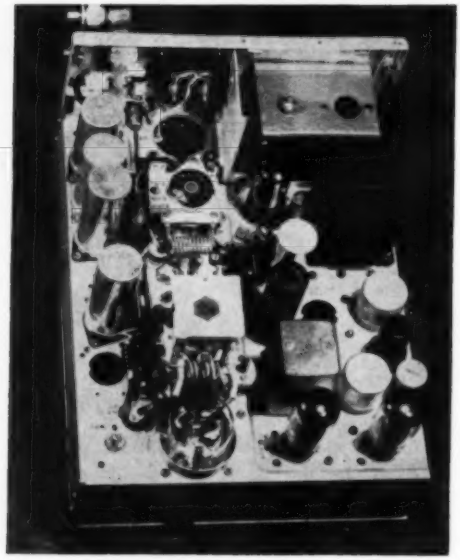

Contact, K-109 White Contact, K-107
Contact, K-116 White-Black-Green-Black Coil, K-107

Locate the altitude gain control on the left front of the chassis, disassemble and discard all components except R-142. Clip the three leads attached to the tuning drive motor assembly. Discount and discard the complete assembly consisting of B-101, C-137, C-138, K-105 and R-135. Pull the three leads out of the wiring harness, unsolder the terminated ends and discard. These leads are routed as follows:

FROM	COLOR CODE	TO
C-138	White-Black-Brown	Contact, S-102
K-105 - R-135	White-Black-Brown-Red	Pin 4, K-103
B-101	White-Black	Chassis Ground

Position the new face panel over the front panel and secure in place with the 4 corner screws. The holes on the left side of the panel mount the VFO enclosure and dial. The dial shown in the photographs is a modified National type MCN and the box is a Bud type AU-1028. Any suitable dial and enclosure may be used and the panel drilling altered accordingly. The VFO tank circuit, shown in Fig. 5, should be mounted in this box. The components specified give a satisfactory tuning range.

In any event, construct in accordance with good VFO practice and juggle coil slug and trimmer capacitor to give the desired coverage of 8,000 to 8,222 kc. Achieve rough settings with a grid dip meter and accomplish final alignment after the equipment is working. Ex-

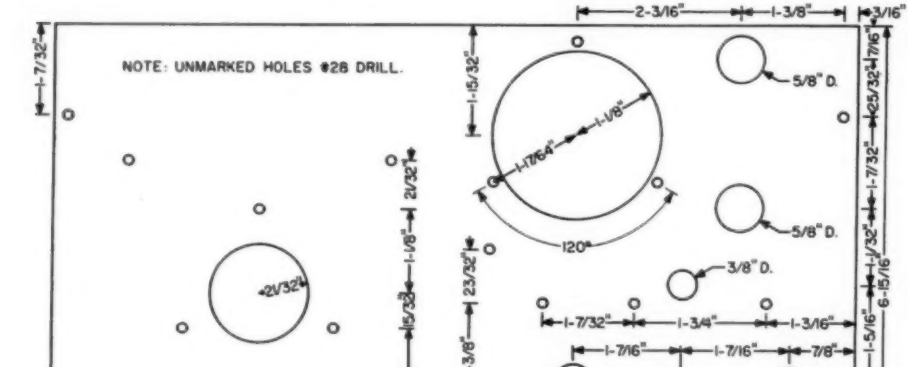

FIGURE 2

Drilling details of new face panel. Material: 16 gauge aluminum. Finish: prime and apply 2 coats flat black lacquer to front only.

tend the V-101 grid lead out the bottom of the box with a short length of #14 or #16 solid, insulated wire. Install the cover on the box and mount the new meter, meter switch, microphone jack, ac line switch and the original antenna relay, K-101, on the panel. Remove and discard the mounting bracket for C-145 and move the capacitor, with leads attached, out of the way for later disposal. Secure the front panel to the chassis, using original hardware.

The audio section of the transmitter contains sidetone amplifier and tone oscillator circuits that are not required in this conversion. The wiring associated with these circuits should be removed and discarded:

FROM	COLOR CODE	TO
Pin 5, V-107)	Shielded Cable	(Contact, K-104
Pin 5, V-108)		(Contact, K-104
Pin 4, T-103	White-Green	R-142
Pin 3, T-101	White-Black	Contact, K-106
R-137	White-Black	Pins 1 & 2, V-105
R-137	White-Black	Ground Lug
Junction C-140 - R-137	White-Brown-Green	Contact, K-106
Pin 2, T-101	White-Brown-Red	R-147
Pin 3, V-106	White-Brown Black	Contact, K-106
Pin 14, P-102	White-Black-Green	LO, T-105
Pin 15, P-102	White-Brown-Red-Green	HI, T-105
Pin 1, T-105	White-Red-Blue	Pin 3, V-109
Pin 2, T-105	White-Red	Pin 5, T-104
LO, T-105	White-Black Green	R-109B
Pin 3, V-109	White-Red-Green	Junction C-144 - C-146
Pin 5, V-109	White-Green	Junction R-139 - R-140 R-143 - R-145
Pin 4, V-109	White-Brown-Red	Pin 2, T-102
Pin 8, V-109	White-Brown	R-144
R-144	White-Brown-Red-Black	Pin 2, V-109
C-145	White-Black-Brown	R-146
C-145	White-Black	Chassis Ground
C-142	White-Brown-Blue	Pin 3, V-106
R-139	White-Black-Green	Contact, K-106
Pin 3, T-103	White-Black-	R-148
R-148	White-Black-Brown	Coil, K-102
C-141	White-Black-Red	Contact, K-106

Ground the unterminated lead of C-141 to a lug secured under its mounting screw. Unsolder the shielded lead, coded White-Green, from the center contact of R-142 and connect to Pin 4 of T-103. Secure the ground lug under a transformer mounting screw. Clean up R-142, discarding R-141, and mount on the front panel as the audio gain control. The White-Green lead runs in a shielded cable, along with the White-Brown-Green lead connected to Pin 5

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of V-106, to the contacts of K-106. Unsolder these leads from K-106 and route to the audio gain control, connecting the White-Brown-Green lead to the rotor and the White-Green lead to the clockwise contact of this resistor. Pick up chassis ground from the sleeve contact of the microphone jack, connect to the ground end of R-142 and connect to the meter switch in accordance with Fig. 5.

Remove and discard transformers T-101 (with terminal board) and T-105; capacitors C-142, C-144, C-145 and C-146; and resistors R-139, R-140, R-143, R-144, R-145 and R-148. At this time, the terminal board adjacent to V-109 should be clear of parts except for R-117 and R-118. V-109 socket should be clean except for the heater connections on Pins 2 and 7.

Excess power and control circuitry and components should be removed to make room for the ac power supply and to simplify the finished product. Remove and discard the following wiring:

FROM	COLOR CODE	TO
Pin 12, P-102	White-Black-Brown	R-133
Pin 12, P-102	White	Coil, K-118
Coil, K-118	White	Contact, S-102
R-113	Bare Wire	Pin 7, V-105
Pin 5, K-103	White-Black-Brown	Pin 8, V-105
Coil, K-102	White-Brown-Brown	Contact, K-106

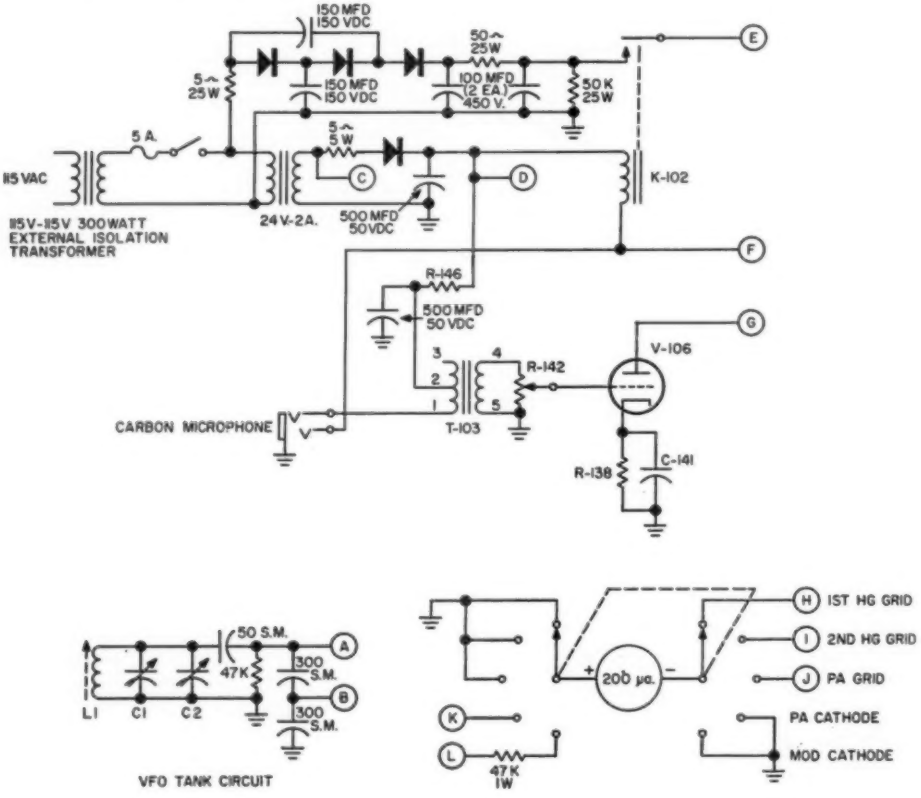

FIGURE 5

1. Circle letters keyed to Fig. 4.
2. 3 digit part numbers are original parts redrawn from Fig. 4 for ease of reading.
3. All diodes are Sarkes Tarzian M-500 or equal.
4. VFO tank circuit to be trimmed to cover 8,000 to 8,222 kc.
   Prototype used following values:
   C-1 . . type "APC" capacitor cut to 2 plates.
   C-2 . . 4.5-25 mmfd ceramic trimmer capacitor.
   L-1 . . 17 turns #26 PE wire on ⅜" surplus, slug tuned coil form.
5. Warning! Chassis is at line potential . . isolation transformer must be used.

Contact, K-106	White-Brown-Brown Spliced to White	Contact, K-117
Contact, K-117	White	Contact, K-118
Coil, K-102	White-Brown	Contact, S-101A - C-135
Coil, K-102	White-Brown	Pin 2, K-103
Pin 2, P-103	White-Black-Orange	Coil, K-106
Pin 3, P-103	White-Black	Chassis Ground
Coil, K-106	Black	Contact, K-104
Coil, K-104	White-Brown-Red-Black	Pin 4, K-103
Coil, K-106	White	R-150
R-150	Remove and Discard R-150	Contact, K-104
Coil, K-106	White	Contact, K-104
Coil, K-106	White	Contact, K-107
Coil, K-106	White	Pin 7, V-103
Pin 7, P-101	White	Contact, K-108
Contact, K-108	White-Black	Contact, K-107
Contact, S-101A	Bare Wire	Contact, S-101B
Contact, S-101A	White	Pin 13, P-102
Contact, K 117	White	Contact, K-118
Contact, K-118	White	Coil, K-101
Coil, K-101	White	Pin 16, P-102
Coil, K-108	Black	Contact, K-107
Pin 5, V-105	White-Black-Brown	Contact, K-104
Contact, K-104	White	Contact, K-117
Contact, K-117	White-Black	Pin 4, V-105
Contact, S-102	White-Black-Red-Black	Contact, K-104
Coil, K-117	White	Contact, K-108
Pin 5, P-102	White-Black	Chassis Ground
Pin 4, P-101	White-Black	Chassis Ground
Coil, K-108	White-Black	Chassis Ground
Coil, K-108	White-Black	Contact, K-106
Contact, K-106	White-Black	Contact, K-104
Coil, K-108	White-Black	Coil, K-107
Coil, K-107	White-Black	Coil - Contact, K-104
Pin 1, K-103	White-Red	Contact, K-102
Pin 8, P-101	White-Red	R-147
R-124	White-Green	Junction R-121 - C-121
S-101B	White-Black	Contact, K-107
R-131	White-Black	Pin 7, V-109
R-131	White-Black-Brown-Orange	Pin 2, V-106

Unsolder the two leads from Pin 6 of V-105; solder these leads together, insulate and lace them to the wiring harness. Install a 6 lug terminal strip on the underside of the chassis, close to the VFO box. Unsolder from S-101B the White lead that runs between this point and Pin 7 of V-103. Dress this lead to the front of the chassis and connect to one of the lugs. Unsolder the remaining White lead from Pin 13 of P-102 and connect it to the same point. The 24 volt AC transformer will connect between this lug and ground.

Unsolder from the contact of K-102 the White-Red lead which runs to the junction of R-117 and R-118. Solder this lead to the top of R-147. The second White-Red lead should be left on the K-102 contact and the other end removed from Pin 10 of P-102. Dress this lead under the chassis and terminate on a vacant of the above mentioned terminal strip for B+ connection.

At this point, both coil terminals of K-102 and one terminal of K-101 should be vacant.

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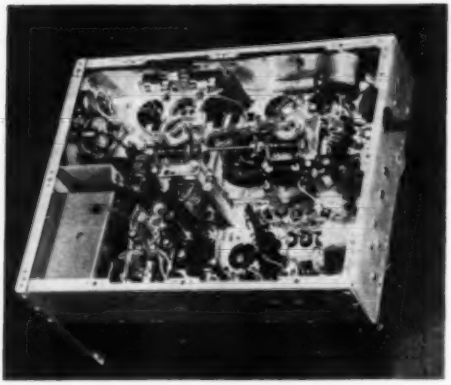

The other coil terminal of K-101 has a White lead which terminates on the top of R-146. This lead remains. Unsolder the White lead from the top of R-132 which runs to the top of R-146 and connect to one coil terminal of K-102. Transfer the remaining White-Brown-Brown lead from Pin 16, P-102 to the vacant coil terminal of K-101. Attach a lead to this point and terminate it on the tip terminal of the microphone jack. The White-Brown-Brown lead is spliced in the vicinity of K-102 and continues to R-148. Open this splice and connect both leads to the vacant coil terminal of K-102. Clip the White-Orange-Green lead from Pin 11 of P-102 and connect to the ring contact of the microphone jack.

Clip the bare lead attached to the bottom of R-132 and use this wire to strap Pins 1 and 2 of V-106. Unsolder the lead from the center contact of R-132 and the leads from the top of R-132. Remove and discard R-132, substituting R-133. Connect the lead removed from the center contact of R-132 to the bottom of this resistor and the two top leads to the top of R-133. Referring to Fig. 5, install and wire the 24 volt DC components on the partially vacated terminal board adjacent to V-109. Interconnect with the original wiring as shown in Figs. 4 and 5. Connect the AC input to the top of R-133 (former R-132) and the DC output to the top of R-146.

Unsolder R-134 from Pin 4 of V-105; remove and discard R-134, R-121, C-120 and C-121. Remove and discard the following components, including mounting brackets if not used to mount other components, and reinstall hardware if required to secure other assemblies: Relays K-104, K-106, K-107, K-108, K-117 and K-118; Capacitors C-134 and C-135; Switches S-101A, S-101B, and S-102; Connectors P-102 and P-103; and the sockets for K-103, V-105 and V-109.

Unsolder the White-Green lead from the junction of L-101 and C-101 and pull through the wiring harness to where it terminates at R-101. Shorten this lead as required and terminate on Pin 8 of V-107. Remove and discard R-101 and R-102; replace R-101 with a 47,000 ohm, 1 watt resistor. Replace R-126 with a 27,000 ohm, 1 watt unit. These steps transfer the meter lead attached to Pin 1 of P-101 from the oscillator grid to the modulator cathodes and change the modulator and PA meter resistors to values compatible with the meter used. Transfer the remaining 5 leads from P-101 to the meter switch and wire the meter and switch in accordance with Figs. 4 and 5. It should be noted that the arbitrary scale used on the meter is not calibrated and that the meter resistors are merely selected to give convenient readings. Any deviations from normal are easy to spot with this system.

Unsolder and discard C-101, C-102, C-103 and L-101 from the V-101 oscillator grid circuit. Install the additional VFO grid components shown in Fig. 5 and connect the new grid tank lead as indicated.

The coupling on the end of the main tuning drive shaft is removed and the hub from a standard ¼" flexible coupling is sweat soldered to the projection of the shaft. A H. H. Smith #166 flexible shaft and panel bearing is installed and the shaft cut to the proper length for easy rotation. A combination of a homemade right angle drive, flexible shafting and brass rod was used for the antenna coupling Rube Goldberg. As previously mentioned, this feature is not essential; if you want to install it, you are on your own. Knobs, decals and right angle coaxial adaptors with type BNC reducers complete the front panel work and give a commercial appearance.

Mount the power supply components in the general areas shown in the photographs and wire in accordance with Figs. 4 and 5. The 24 volt transformer specified may be used or you, as the writer, may wind your own. Carefully check your wiring, visually and with an ohmeter. If all looks good, remove the input silicon rectifier and plug into the *external isolation transformer*. Apply power, plug in a T-17 or equal mike and check for lighted tubes and proper relay operation. If operation is normal, remove power, install the silicon rectifier, connect a 6 watt, 117 volt lamp as a dummy load and reapply power. Check for smoke and measure the B+ voltage which should be slightly below 400 volts under load.

Set the VFO to mid-range and tune the

ganged tuning control for maximum PA grid current. Touch up the slug in L-103 and the mechanical trimmers on C-106, C-115 and C-122 for maximum grid drive to the PA. Adjust C-130, the antenna coupling link and the mechanical trimmer on C-129 for maximum brilliance of the lamp load. Using a frequency meter or calibrator checked receiver, adjust the VFO coil slug and trimmer capacitor for a coverage of from 8,000 to 8,222 kc. Advance the audio gain control, while talking into the mike, until the lamp brilliance increases on voice peaks. Tune the signal in on a local receiver and check the quality of the signal, taking such corrective measures as are indicated. On the air operation is next on the agenda and if reports are good and the FCC isn't camping on your doorstep, you are ready to button it up. Dress up the wiring and replace the cable runs that are too chewed up. Install the bottom plate and top cover to complete the job.

In retrospect, several changes could be made in this conversion. Admittedly, use of a power tube such as the 6V6 would not be attempted in a "from scratch" VFO design. Further, lack of voltage regulation and the location of the tank circuit next to the heat producing power supply components will draw screams from the purists. Despite these handicaps, performance is good. Of course, there is drift but even a selective receiver has no difficulty in keeping up with the signal. For those who wish, the oscillator can be left as is and a front panel crystal socket installed. This will solve the problem and greatly simplify the conversion. Use of an existing, external power supply, if desired, will further decrease the effort required in this conversion.

Despite the problems encountered and the effort expended, this is a satisfactory conversion. Good performance, low cost and commercial appearance more than compensate for the work involved. . . . W4WKM

Photography by: Morgan S. Gassman, Jr.

FCC ACTION

The FCC has amended our regulations to permit mobile operators to simplify their log keeping in that they no longer have to log time times of start and endings of each contact, but only have to log the time of starting operation and ending operation. Big deal.

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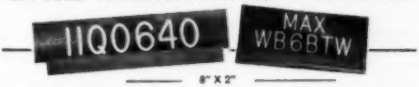

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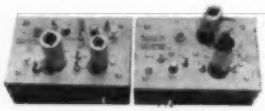

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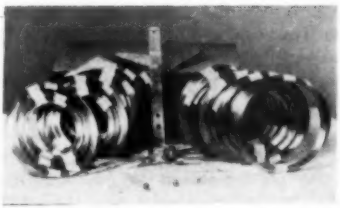

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What is the Institute of Amateur Radio?

Basic Purpose: To enable amateurs to get more fun out of ham radio.

() Since it is axiomatic that the more you know about ham radio the more fun you will have, one of the main interests of the Institute is to encourage technical proficiency.

b) World friendship, through our hobby, leads to greater enjoyment and international good will. In the interests of this the IoAR will be sponsoring a number of international "tours" to enable U. S. amateurs to personally meet foreign amateurs. Group travel permits Institute members and their families to travel at a considerable saving over the normal trip costs.

c) Since the present FCC system for modifying rules and regulations favors the majority views it is important that minorities be able to present their ideas and be given every encouragement for technical advancement. The IoAR will try to help such minority groups to be better understood and to promote legislation which will help these groups where it is not to the detriment of the majority. Ham groups interested in TV, RTTY, wideband FM, remote repeaters, remote control, etc., are cases in point.

d) Our hobby will be the most fun for the most operators when our rules and regulations meet the immediate present day demands of active amateurs. By encouraging discussion and progressive thinking along these lines the IoAR hopes that amateurs will take a greater interest in the running of their hobby and will exert their influence intelligently.

e) It is NOT the intention of the Institute to become a second ARRL. This means that unless the members of the IoAR decide otherwise there will be no QSL Bureaus, no traffic handling nets, no myriad of contests, etc.

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Verviers Rally

A Funny Thing Happened To Me On The Way To The Zwaanaardestraat . . . .

Dear **Wayne**,

Amateur radio history was made on Sunday, April 28th in a small town in Southern Belgium. The Verviers Rally marked the dawn of a new era in amateur radio . . . the beginning of Reciprocity!

Though much has been written and a lot more pronounced on the subject of reciprocity, it was the Belgians and the Dutch, always reputed for their good sound sense, that broke the ice and arranged it so that overseas amateurs could obtain temporary licenses for a short period to cover the Verviers Rally.

The result was a shower of overseas amateurs, their wives and families, in gay vacation spirit, descending on the area in off-season . . . no doubt to the gratification of hotel keepers and the souvenir stores.

British, French, German and U. S. amateurs applied for the distinctive ON5 and PA9 calls. They were only on for the one weekend, too bad if you missed them!

I crossed the English Channel with my husband G3NMR, our two sons and guests G3BHT and G3PAH, all in our large station wagon which was complete with a little SSB transceiver, the fabulous Little Courier, as described in the journal of the Amateur Radio Mobile Society, plus a two meter rig. Though we were armed with enough documents to bog down the car at no time was any of the mobile gear questioned by customs officials and the sheaf of papers returned to London virgo intacta.

Naturally it poured the whole day of the Verviers Rally. Even so there were many contests, including a fox hunt, a treasure hunt, etc. No doubt you'll find the scores recorded somewhere in some radio magazine for those interested in such mundane matters, but the important thing was that everyone had a marvelous time and that good humor, friendship, cooperation and good will were the rules of the day. The noise of many nationalities all talking different languages at the prize-giving was thrilling to hear.

One of the real high points for any trip is the different food that you encounter. I'll never forget a Dutch breakfast: six different kinds of bread, slices of butter, loads of ham, Dutch cheese, jam, chipped chocolate to sprinkle over your thickly buttered currant bread and the finest coffee I've ever had. The breakfast, complete with hotel room with hot and cold running chambermaids cost only $2.50 per person!

On the Ostende-Brussels autoroute we operated as ON5ZC and worked, while in motion, a UA1, WA2, and a 5A4. CN8FR called us and held on until we crossed the Dutch border and changed to PA9NMR. The little Courier SSB transceiver sure gave a good performance.

In Rotterdam we worked a gaggle of two meter stations and in Leiden PAϕHVN sent out mobile two meter stations to bring us in for tea. Other PAϕ's soon rolled up and we had quite a hamfest right there on the edge of a daffodil field (the tulip bulbs are late this year due to cold weather).

The trip to Verviers was marvelous and all who attended had a wonderful time. Let's hope that the event will be yearly and that many times as many stations turn up for in next year.

Sylvia Margolis
(Mrs. G3NMR).

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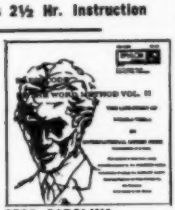

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(W2NSD from page 7)

troversy I see no point in arguing about something that obviously was never intended to be anything but something to argue about. There are enough serious real problems afoot; let us hope that the ARRL directors don't get involved in this.

VHF Hamfest

The Microwave Society of Long Beach is sponsoring a three day hamfest June 14-15-16 at the Lafayette Hotel. Write to K6GKX, Box 3303, Long Beach 3, Cal. for info.

Swampscott

The Swampscott Convention this year seems to have been the biggest one yet. I know that our booth was jammed just about solid for the entire duration and we sold a record number of subscriptions to the magazine. Even more important to me was the flood of fellows taking time out to stand patiently around until they could break through the mob and tell me that they liked the magazine. This is quite a change over the reception of just two years ago when hundreds of fellows were amazed to find a new magazine in publication. This time not one chap wanted to know what on earth 73 was . . . they all knew.

It does not dismay me to report that our special issues of 73 have been driving one or two other ham magazine publishers to distraction. The big March Receiver issue really rocked them back on their heels. Nothing like this had even been thought of before. Then came the Transceiver section in the 128 page April issue! If you were one of the hundreds of readers that wrote in and thanked me for that one I want you to know that your letter, though unanswered, was appreciated.

In May we rested up with a smaller issue, gathering steam for this Surplus Special. As you thumb through the magazine you'll note that I have managed to round up the largest collection of surplus listings ever published anywhere. Only one or two surplus dealers managed to evade my persistance, plus a few that were deliberately left out so you won't have the misery that I have had in dealing with them. We've got the good guys here, with but few exceptions.

You might just as well read through the surplus section, for it is just as much a special section as that receiver compendium back in March. It cut down on the number of articles for this month, but that seems like a small enough sacrifice to get in this giant catalog.

Our fellow publishers can take heart that

we have nothing really outstanding planned for July and August, outside of a section on Quads and another on Towers. Heh, heh . . . wait'll you see that 40 meter quad! Watch out in September though . . . and OCTOBER! Our 4th annual October issue is going to be a corker. I won't tell any more about it right now for I don't want to ruin their summer completely. Oh, yes, I expect the subscription rates will be a little higher by then too . . . have to with the larger magazine, you know.

No Music to his Ears

The FCC, after a ridiculously long time, finally quashed the petition sent in by Fred Huntley W6RNC asking that amateur stations be permitted to play the National Anthem twice a day. RNC had been in trouble with the FCC over the rabble rousing "Anti-Communist Amateur Radio Network" broadcasts that he had been making. His mimeo machine seems to be still busy grinding out hate propaganda for weak minded hams to wallow in. I'm not sure whether he is still providing recorded telephone messages since he was publicly accused of anti-Semitism for one of his phone messages. The Anti-Defamation League said the "patriotic" materials RNC urged upon those who dialed his number included "staple horror items in the arsenal of professional bigots." Thank heavens out of the 250,000 hams we have in this country there are only a handful like this one. Now, how do we wash that hand?

New Product

Lafayette HE-80 Receiver

You'll want to know more about this new communications receiver announced by Lafayette Radio, 111 Jericho Tpk, Syosset, L. I., N. Y. The HE-80 sells for $149.50 and covers general coverage from 550 kc to 30 mc with electrical bandspread and separate calibrations from 10 thru 80 meters. It also covers 48-54 mc with dual conversion. It features a product detector, BFO, Q-Multiplier, crystal calibrator, ANL, S-Meter, and many other interesting points. Quite a package. Write Lafayette for more info.

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Leave Berlin Oct. 27th
Arrive Idlewild Oct. 27th

This being an all-ham flight will make it a lot more fun than an ordinary trip. In London, in addition to a big hamfest with the local ops, you will have four days to get lost in the underground, shop in the famous English shops, see a music hall and visit as many G's as you can manage. Then on to Paris where we will meet the French hams, shop in the Flea Market for unbelievable bargains, see the International Automobile Show, meet many INTERESTING French girls, see the Follies, the amazing Lido nightclub (costs $8, but wow is it worth it!), the Metro, the Eifel Tower, the Louvre and some coffee while watching the beautiful gals walking along the Champs. Next stop Geneva where you find the finest international shopping in the world, a visit to 4U1ITU, and maybe a side trip to Chamonix for the adventurous to ride the cable car up Mt. Blanc, one of the most exciting rides you'll probably ever run into. Rome is the next stop. We only have four days to do a months sightseeing and sample the ambrosia of their inexpensive but incredible restaurants. On Sunday we all can get a Papal Blessing . . . and wait'll you try the real Italian ice cream! Then we're off to Berlin, over 100 miles behind the Iron Curtain, where you'll not only see and feel the infamous wall, but you'll get a guided tour behind the wall and see for yourself the desolation of the Communist East Germany and East Berlin. Don't forget a camera and plenty of film. Berlin also has some of the finest shopping in Europe, one of the most famous zoos in the world, and some unforgettable nightclubs such as the Resi.

Since this is a club group it is necessary that one member of your immediate family must be a member of the Institute of Amateur Radio (send $1 to join). Send $250 with your reservation for each person going, the remaining $300 is due 60 days before blast-off, August 6th. Full refunds can be made up until one week before flight time should some disaster strike. We have to have the reservation money so we can reserve space on planes, in hotels, etc. Send reservations and check to the Institute of Amateur Radio, Peterborough, New Hampshire.

Compare the cost of this trip with the most economical regular air travel and you'll find that the same itinerary would cost you $630 for air fare alone. That's the nice thing about group travel and having a non-profit club running things.

We're going to all have the time of our lives, how about coming along. Even if you have to sell the car or borrow the money this will be well worth it . . . an experience you'll never forget.

73—Wayne Green W2NSD/1

B&W

Send for your copy of our new 1963 catalog

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Radio Communications Equipment
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(TV from page 64)

VIDEO & SYNC jack. You should now have a picture on your receiver or monitor. If the video from your scanner or camera has negative going sync and blanking, the switch on the modulator next to the 7F8 should be in the minus position, if the sync and blanking are positive going, the switch should be in the plus position. This should make the picture on your receiver positive. If your receiver is positive and your monitor has a negative picture and the switch is right, then remove the four screws on the MONITOR and ANTENNA plugs and lift out the diode probe box from the bottom. Reverse the polarity of the diode and replace the box. Trace the lead to the meter switch and reverse it also so that your antenna meter will read properly. Now both your receiver and monitor should have positive pictures.

You will find that slight retuning of the cathode line is required for the best picture.

Now remove the loop and connect the antenna and you are on the air!

Your average input with an 800 volt supply will be about 35 watts. Which means your peak input (on sync peaks) will be about 100 watts.

Raising the high voltage supply to about 1200 vdc will raise the average input to just under the 50 watt limit presently on the 420 mc band.

Without expensive test equipment it is difficult to obtain accurate power output measurements. Good dummy loads at 450 mc are not easy to come by. However, with 24 watts input there was sufficient output to cause severe overheating of a homebrew 4 watt dummy load made of 4 one watt carbon resistor. This type of resistor is a poor UHF load and would tend to cause power measurements to appear lower than they actually are. I believe that this transmitter is capable of eight to ten watts average output at 25 watts average input. In any case, this unit will make a substantial difference in signal strength over 1 and 2 watt type rig as well as providing a beautiful driver for a 500 or 1000 watt amplifier should the current 1 KW on 420 proposal be passed.

Some difficulty was encountered in acquiring 3C22's inexpensively, but we finally found that J. J. Candee Co., 509 N. Victory Blvd., Burbank, Calif. will supply them brand new and guaranteed for $15.00. The ART-26's less tubes, meter and power supply are available for $24.95 through Kencol Electronics, 2816 E. Norwich, Fresno 26, California. Don't mistake the APT-5 for the ART-26. This transmitter is similar in appearance but it is not a television transmitter. The 6AB7 and the 7F8 may be purchased locally but if you can't find any they are available through Allied Radio, 100 N. Western Avenue, Chicago 80, Illinois.

SUBSCRIPTION RATE: **$3.50 per year**

NEWSSTAND RATE: **$4.80 per year**

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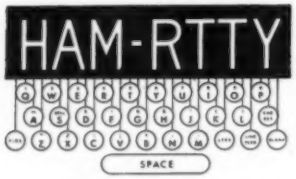
73 Products

Peterborough, N. H.

NEW RTTY BOOK $2.00



This handbook is written for the beginning RTTY op, but due to the profusion of info, pictures, circuits, etc., it will be valuable to all RTTY'ers and those who may RTTY themselves. If you don't know what RTTY means don't buy it. For $2 what can you lose? It's worth almost that much in paper.

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Rather thorough exploration of the subject, complete with an exhaustive bibliography. By WϕHKF

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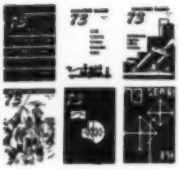
BACK ISSUES 50c



You can enjoy back issues of 73 just as much as current. Send for one each month to pad out those dreary days. All back issues now available except January 1961. Early issues going to $1 soon. Supply very limited.

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K9AMD's interesting book on all aspects of forming and holding together a ham club. This is the result of exhaustive interviews with many club officers and will be invaluable to every club going.

SIMPLIFIED MATH 50c

This booklet takes you gently by the hand and leads you through the mysteries of Ohm's Law, squares, roots, powers, frequency/meters, logs, slide rules, etc., and does it by an amazingly new method.

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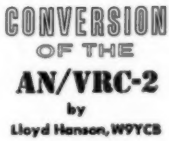
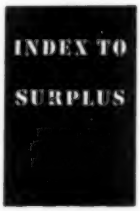


Exhaustively complete instructions on converting the surplus and inexpensive VRC equipment for six meter wide band FM ham net operation. Get thyself on 52.525 mc and join the national wide band FM activities.



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Complete schematics and thorough conversion details on this modern transceiver which covers 2-9 mc (80-40 meters . . . and 160). This unit now sells for $40 to $50 surplus and is easily converted into a terrific little transceiver.

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Written by an expert. One of the best methods for learning the code yet devised. Lays in a good foundation for later high speed CW ability. CW can be a lot of fun if you go about learning it the right way. This book will be invaluable to the beginner and the ham who wants to really increase his code speed.

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73 Parts kits

In the interests of making home construction simpler for those readers with anemic junk boxes 73 has gathered together the parts required for building our less complicated projects. These kits are as complete as we can make them, containing good quality parts. Except where the chassis or case is integral to a unit we do not supply it. We will mention when we do supply a case or chassis. We do supply tubes, sockets, condensers, resistors, transformers, connectors, etc. The kits are kept in stock to the best of our ability, though sometimes the distributors who supply us delay us a bit.

3 NUVISTOR 2M PREAMP. Mar 63 p8
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K6LJY-2 Kit $16.50

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Factory Tested Gtd.!

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D.C. or Batty. Derate 20%

rms/piv	rms/piv	rms/piv	rms/piv
35/50	70/100	140/200	210/300
.07	.14	.19	.29
rms/piv	rms/piv	rms/piv	rms/piv
280/400	350/500	420/600	490/700
.34	.44	.53	.69
rms/piv	rms/piv	rms/piv	rms/piv
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.85	.98	1.08	1.50

Low Priced T300 Silicon Diodes Rated 400 pvi/280rms @300Ma @100°C , .25 each; 30 for $7; 100 for $20;

Diode order $10 shipped Post free

ZENER DIODES 150 to 400 MW CASED TO24 Pckg. Within 20% V'Range $1, 3 for $2, 20 for $10, **KIT ZENER DIODES** up to 400MW, SINGLE & DOUBLE ENDED 2 for $1; 12 for $5; 100 for $36.

SILICON POWER DIODE STUDS*

Operation Up to 125°C Case Temp.

D.C.	50Piv	100Piv	150Piv
Amps	35Rms	70Rms	105Rms
2	.23	.34	.42
3	.50	.85	1.10
6	.70	.95	1.15
12	.85	1.15	1.35
35	1.80	2.20	2.95
70	3.75	4.50	5.00
210	4.50	5.40	7.70
D.C.	200Piv	300Piv	400Piv
Amps	140Rms	210Rms	0Rms
2	.49	.60	.84
3	1.25	1.50	1.80
6	1.40	1.65	1.95
12	1.60	1.85	2.07
35	3.25	4.90	6.10
70	5.60	8.80	Query
240	9.00	Query	Query

**Derate 20% for Battery or Capacitive Load or D.C. Blocking!*

**Stud mounted on Heat-sink*

LO PRICED SILICON TUBE REPLACEMENTS WITH BUILT IN SURGE AND SERIES BALANCING PROTECTION

TYPE	VRMS/PIV	AMPS	PRICE
T866	5000/10400	0.3	$16
T5R4	1900/2800	0.5	$7

"TAB FOR TRANSISTORS & DIODES!"

Full Length Leads Factory Tested & Guaranteed! U.S.A. Mfg.

PNP Hi Power 15 Amp. TO3 & TO36 Round Pckg.
2N441, 2N277 $1.25, 4 for $4; 2N442, 2N278 $3@, 2 for $5; 2N443, 2N174 $4@, 2 for $7; 2N677 $1@, 12 for $10; 2N677A $2@, 6 for $10; 2N677B $3@, 4 for $10; 2N677C $5@; PNP 2N123, 2N107, CK722 4 for $1, 25 for $5; NPN 2N292, 2N293, PNP 2N223 ¢30@, 15 for $4, 100 for $22; PNP 2N670/300MW ¢40@, 20 for $7; PNP 2N671/1W ¢60@, 10 for $5; 2N597, 2N598, 2N599 PNP $1.50@, 4 for $5.
$10 or more this item POSTPAID U.S.A.

RND(TO36), or Diamond (TO3) mica kit 30¢ ea. Power Heat Sink Finned (80° sq.) $1.25, 5 for $5.

GTD! Power-Diamond-Transistors Factory Tested

***MFGRD in U.S.A. Univ. Replcmnt 2N155, 2N156,* 2N234, 2N256, 2N307, 2N554**
SPECIAL TO3GP .....55¢, 10 for $5
40 for $18
$10 or more this item we pay P.P./U.S.A.

Kit Glass Diodes equiv. 1N34A, 16, 48, 51, 60, 64, 87, 105, 109, 147, 287, 288, 295, 12 for $1, 100 for $7.50.

WE BUY! SWAP & SELL TRANSISTORS, DIODES, ZENERS

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"TAB" Tubes Factory Tested, Inspctd, Six Months Guaranteed! No Rejects! Boxed!
GOVT & MFGRS Surplus! New & Used

OA2	1.00	6J7	.99	5651	1.20
OA3	.95	6K7	.79	5656	3.00
OB2	.65	6L6	.99	5670	.89
OC3	.65	6SN7	.72	5687	.90
OD3	2/$1	6SR7	.99	5725	.75
OZ4	.79	6V6GT	.70	5732	.65
1B3	.99	6X5	.69	5751	1.00
1L4	2/$1	12AT6	.59	5814	.60
1R5	5/$1	12AT7	.85	5879	2/$1
1S4	.60	12AU6	.63	5894	13.50

We Swap Tubes! What Do/U Have?

1T6	.60	12AU7	.69	2AP5	3.00
1T5	.55	12AX7	.75	5BP1A	5.00
1U4	5/$1	12AY7	.89	3KP1	6.00
1U5	.65	12BA7	.90	3SP1	3.00
1X2	.99	12BE6	2/$1	5CP1	5.00
2C39A	10.00	12BH6	3/$1	5CP4A	6.00
2C40	5.00	12J5	.69	5MP1	6.00
2C43	5.50	12J7	.69	5MP4	6.00
2C51	1.25	12K8	.70	5NP1	6.00
2D21	2/$1	12SC7	3/$1	5ABP1	20.00

Send 25¢ for Catalog!

2E32	1.75	12SG7	.60	5AQP1	20.00
2E34	1.80	12SH7	.60	5AQP7	20.00
2E35	2.50	12SJ7	.60	5AP1	5.00
2E36	1.80	12SK7	.75	5ADP1	35.00
2K25	6.50	12SL7	.59	5ADP7	25.00
2V3G	2/$1	12SN7	.99	5BP1	6.00
2X2	2/$1	12SR7	.59	5BP2	6.00
3C24	3.00	24G	3.00	5BCP7	25.00
3D21	2.40	25A6	1.25	5BQP2	35.00
3E29	5.90	25L6	2/$1	5BHP2	25.00

Wanted 304TL Tubes

3Q5	.85	25T	5.00	5CP1A	7.00
4-65A	9.50	25Z5	.75	5CP2	4.00
4-125A	21.00	25Z6	.75	5CP7A	6.00
4-250A	33.00	35Z5	.85	5CP11A	5.00
4X150A	16.00	50L6	2.50	5EP1A	18.00
4X250	34.00	50L6	2/$1	5EP4A	18.00
4X500	37.00	75	.81	5FP2	3.00
5AC7	1.00	83V	2/$1	5FP7A	3.00
5T4	2/$1	2000T	150.00	5FP14	3.00
5U4	.75	4X150C	12.00	5FP14A	6.00

125°C SILICON PNP TRANSISTORS
250 to 400 MW
FULL LENGTH LEADS
Factory Tested & GTD!
$5 to $11 — SMALL — TO5 & TO18 Pckg. Replaces 2N327A; 332, 3, 4, 5, 6, 7, 8; 474, 5, 6, 7, 8, 9; 2N480, 541, 2, 3; 2N935, 36, 37; 2N1034; 2N1131, 2; 1276, 7, 8, 9. "TAB" SPECIAL ¢69@, 7 for $4, 20 for $10.
$10 or more this item, we pay P.P./U.S.A.

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5Y3	.59	6-40A	33.00	5JP1	2.00
5Z3	.89	250TL	18.00	5JP2	1.00
6A3	.99	307A	3/$1	5JP14	25.00
6A8	.99	VR92	5/$1	5LP1	18.00
6AD4	2/$1	308A	2/$1	5LP1A	25.00
6AC7	.69	310A	1.00	5LP4	6.00
6AG5	.59	350B	1.00	5LP7A	6.00
6AC7	2/$1	6146	2.45	5RP1	25.00
6AK5	.69	450TH	25.00	5SP7	15.00

Wanted Test Sets and Equipment

6AL5	.59	450TL	24.00	5SP7A	21.00
6AQ5	.65	700	11.50	5QP4	8.00
6AR6	.75	707B	1.25	5UP1	8.00
6AS7	2.85	715C	10.00	5XP21	36.00
6AT6	.65	721AB	2.50	5YP1	25.00
6AU6	.70	725A	3.50	7BP1	5.00
6B8	.80	805	3.35	7BP4	5.00
6BE6	.79	808	1.10	7BP4A	5.00
6BQ6	1.69	811	3.90	7BP7	5.00
6BH6	.79	811A	4.75	7BP7A	5.00

Top $$$ Paid for 304TL, 813, 811A, 812A Tubes

6BK7	.99	813	3.95	7EP6	5.00
6BL7	1.30	813	12.00	7CP6	7.00
6BQ7	1.11	829	1.75	9AUP7	5.00
6BV5	1.19	829B	7.50	9JP1	5.00
6BZ6	.73	832A	5.00	9LP7	1.00
6C4	.49	833A	36.00	10BP4	5.00
6C5	2/$1	837	3.50	10KP7	11.00
6C8	2/$1	866A	1.50	12GP7	7.00
6CB6	.79	954	10/$1	12QP4	9.00
6CD6	1.49	957	10/$1	12KP4A	9.00

Top $$$ Paid for 304TL Tubes!

6E5	.79	991	5/$1	12SP7	11.00
6F6	1.85	1619	5/$1	14EP6	10.00
6F8	2/$1	1620	1.00	16GP6	12.00
6F6	2/$1	1625	3/$1	16QP4A	12.00
6F8	.74	1626	12/$1	17AVP4	14.00
6H6	6/$1	1629	6/$1	17AP4	14.00
6J4	1.75	1630	1.20	17CP4	14.00
6J5	2/$1	5517	2/$1	17KP4	14.00
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Kit 10 Germanium Diodes
Kit 5 Phenolic Terminal Strips
Kit 2 pair 80239 & PJ.a
Kit 12 Binding Posts Assid

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Kit 4 Microwaves
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Kit 100 Gold/Top Screws
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It's got guts!

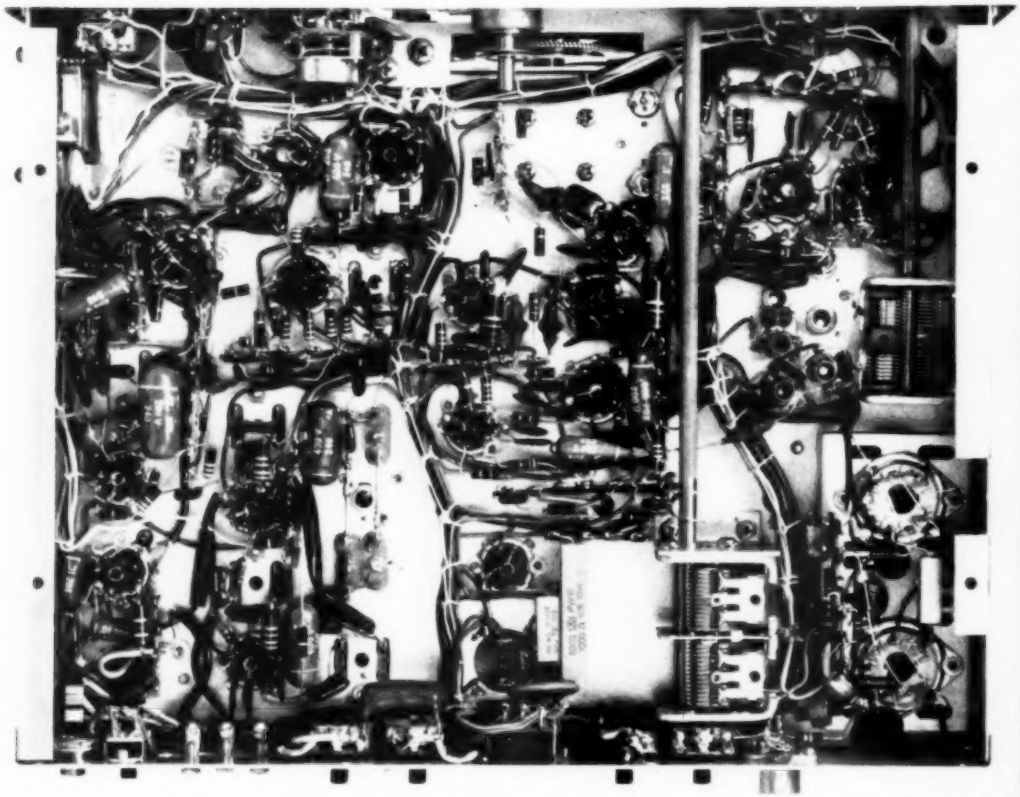
It takes more than handsome, functional styling to make a great transceiver . . . In plain language, it takes guts. The rugged good looks of the NCX-3 were styled by Industrial Designer Gregory Fossella to complement the performance and features engineered into the NCX-3 by National's Advanced Development Team. Take a good close look at the photo below. 18 tubes and 6 diodes add up to the one SSB/CW/AM transceiver in the $300-$400 price range that gives you the features you want and need — with the conservatively rated parts, handsome layout and wiring workmanship that you expect from National. The NCX-3 wasn't designed with the intention of providing marginal "condensed communications" — It has a lot of parts. But notice that components run at right angles for easy circuit tracing and service . . . that it isn't necessary to unsolder three layers of wiring to get at one component . . . that even the resistor color codes all run in a parallel direction!

It's no wonder that the NCX-3 is backed by National's One Year Guarantee, or that the NCX-3, by actual dealer count, outsells all other transceivers. It's no wonder, because the NCX-3 at $369 is the only transceiver in its price range with built-in important features required for fixed station as well as for mobile applications:

- Complete coverage (with overlap) of the 80, 40 and 20 meter phone and CW bands
- Built-in grid-block break-in keying
- Built-in Vox, as well as push-to-talk
- Built-in RF-derived SSB/CW AGC without annoying pops or thumps
- Built-in S-Meter and PA current meter
- Built-in AM detector for full compatible AM operation
- Conservatively rated Pi-network final amplifier runs black at full 200 watts PEP
- Mobile mount included in the price!

A lot of sideband transceivers have been advertised recently . . . nevertheless, we suggest you take the time to compare all of them with the NCX-3 — we know of no better way to satisfy yourself that you'll be happy with your choice — that you've chosen a rig that does what you want it to do. As a first step, write us today (enclose 50¢ for handling and postage) for a copy of the NCX-3 Instruction Manual. In the meantime, ask your National Dealer to give you an actual demonstration of the NCX-3 Tri-Band Transceiver.

NATIONAL RADIO COMPANY, INC.
37 Washington St., Melrose 76, Mass.



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